THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXX. No. 751.] LONDON, OCTOBER 2, 1877. [29TH YEAR.] Price 6d.

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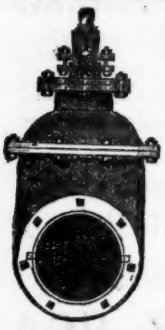

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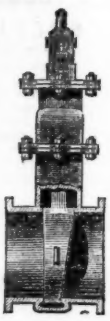

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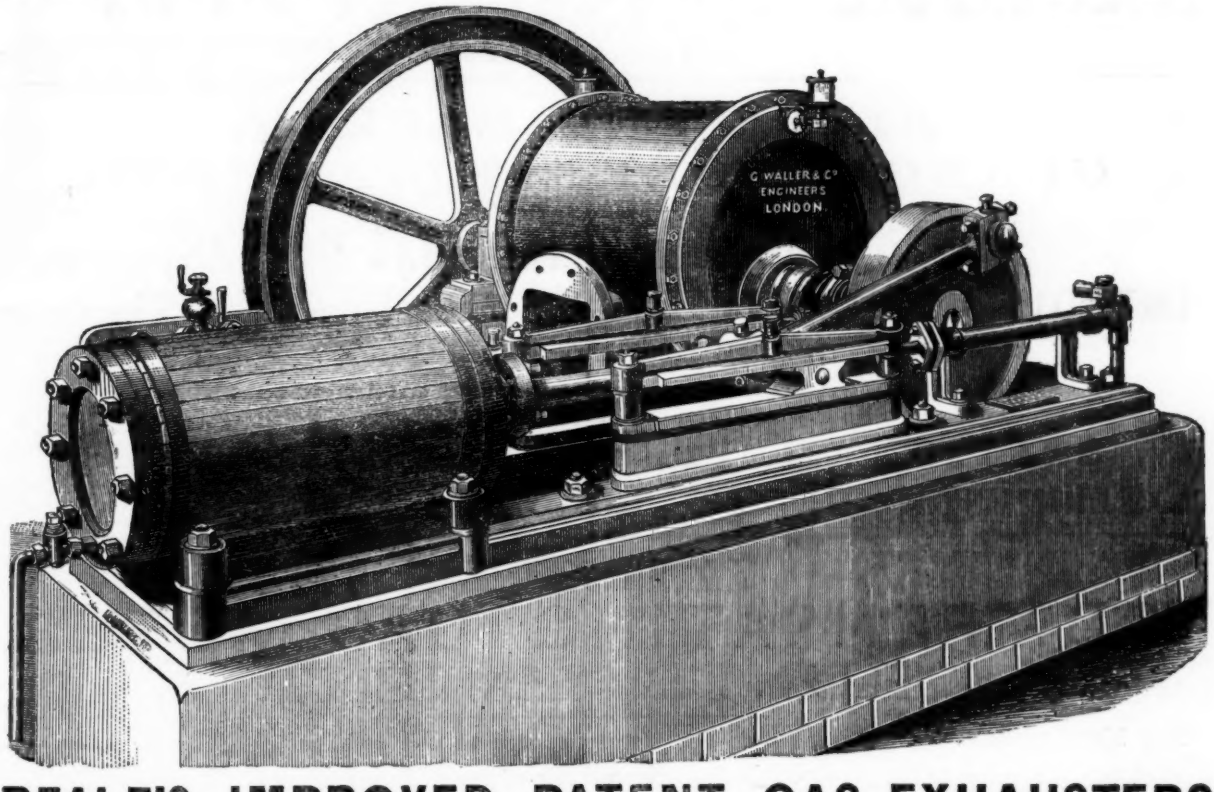

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This Meter supplies a want long felt, by putting an end to the loss sustained by Gas Companies through the overworking of their Meters.

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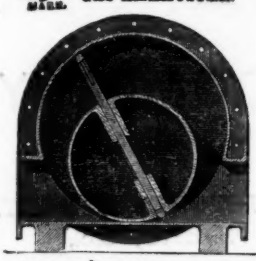

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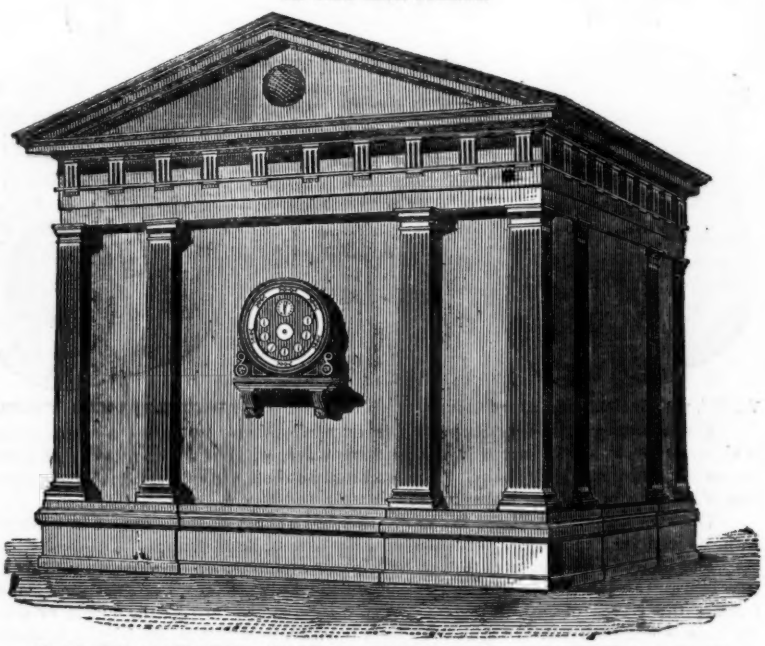

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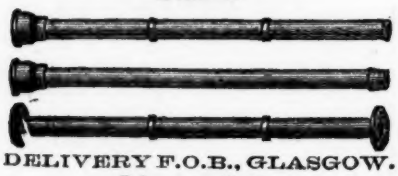
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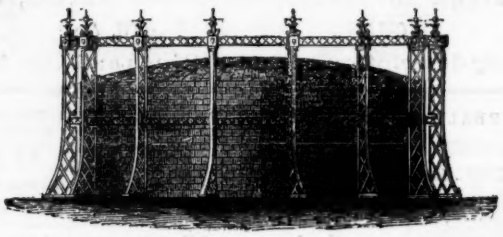

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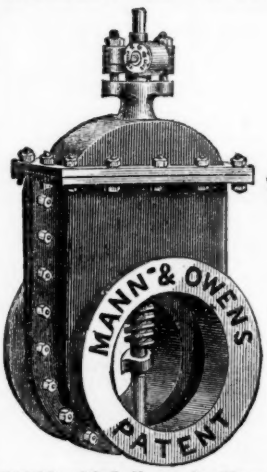
MANN & OWENS' PATENT GAS-VALVE.


EVERY VALVE WARRANTED TO BE PERFECTLY SOUND AND GAS-TIGHT.

VALVE, with Indicator for Above Ground. UNDERGROUND VALVE.
The advantages of this Patent Valve over all others yet introduced are, that it is always as tight as the best wedge or spring valve, without the possibility of setting fast or becoming suddenly leaky. The surfaces not being in contact during the operation of opening or closing, leakage through wear and tear is avoided.
The Gas Engineer will not fail to see the importance of such a valve in connexion with his purifying apparatus, particularly in the case of large sizes.
The slide being operated either by a screw and nut, or by a pinion and rack, a cam bearing upon a plane, cast on the back of the Valve, forces it against the face, and renders the escape of gas an impossibility. By a slight turn of the pinion or screw, the slide is released, and brought away from the face, by which means friction is avoided, and the only force required to open the Valve is that due to its own weight.
SOLE MANUFACTURERS:
S. OWENS AND CO.,
HYDRAULIC AND GENERAL ENGINEERS,
WHITEFRIARS STREET, LONDON, E.C.
PRICES, SIZES, AND FULL PARTICULARS ON APPLICATION.

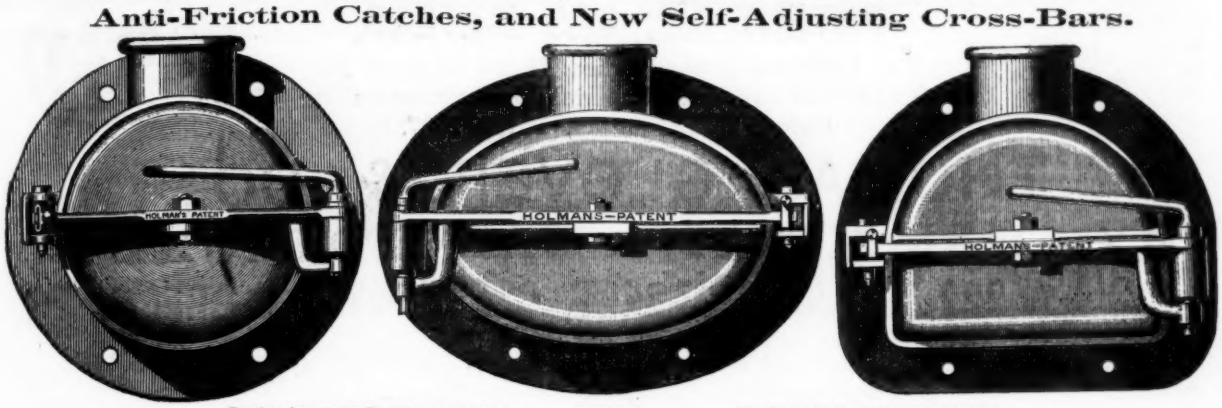
TANGYE BROTHERS AND HOLMAN,

10, LAURENCE POUNTNEY LANE, LONDON, E.C.

SOLE MAKERS OF MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH HOLMAN'S PATENT ECCENTRIC FASTENINGS,

Anti-Friction Catches, and New Self-Adjusting Cross-Bars.



Instantaneous Sealing effected. No Luting. No Duplicate Lids required.
Holman's New Self-Sustaining Cross-Bar ensures freedom of Joint, and maintains parallel position of the Lids.

Since their introduction in 1869, these Patent Retort-Lids have been thoroughly tested (rigid cast iron is now successfully employed), being now in use in nearly all the principal Gas-Works in London and the Provinces.

Messrs. T. B. and H. are now making the "Morton's Self-Sealing Lid" of the SAME FORM OR SECTION AS THE RETORT ITSELF (see Illustrations above), instead of, as heretofore, bringing the Mouthpiece from the D or Oval at back to Circular in front.

D and Oval Morton's Lids have now been working satisfactorily for the past two or three years, both in this country, on the Continent, and in the United States of America. Among others they have been adopted by the following Gas-Works:—

The Gaslight Company's Works, Fulham; Ditto, Bromley-by-Bow; Ditto, King's Cross; Ditto, Shoreditch.
And also in the Gas-Works at Richmond, Maidstone, Gloucester, Glasgow, Portsea, Roubaix (France), The Hague (Holland).

HUNT'S PATENT EQUILIBRIUM GAS-GOVERNOR.

In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown in the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.

The principal advantages of this arrangement over the ordinary form of Governor are as follows:—

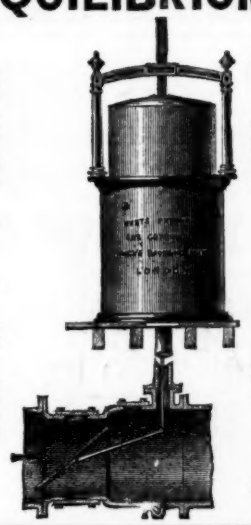
Its sensitive action prevents oscillation.

It is self-adjusting—i.e., it maintains a steady pressure under variations of inlet pressure or a fluctuating consumption.

The inlet to Gasholder being contracted to the smallest possible dimensions, all danger from leakage through insufficiency of seal, tilting, &c., is entirely avoided.

The valve portion being separate from the holder, it can be handled and fixed like an ordinary Slide-Valve direct in the main; and the holder can be placed at any convenient distance immediately above it. The cost is thus materially reduced, and the inconvenience of heavy lifts done away with.

There are no working parts likely to get out of order.



These Governors have been adopted by many leading Gas Companies, among whom are the following:—

The Gaslight and Coke Co. (9), The London Gas Co. (3), and at Abergavenny, Arundel, Birmingham, Cannes (France), Devonport, Dursley, Exeter, Guernsey, Halesowen, Mentone (France), Monmouth, Newcastle-on-Tyne, Oxford, Plymouth, Rochdale, Windsor, &c.

TESTIMONIAL.

The Gaslight and Coke Company,
9, Water Street, New Bridge Street,
Blackfriars, E.C., Feb. 27, 1875.

MESSRS. TANGYE BROTHERS AND HOLMAN.

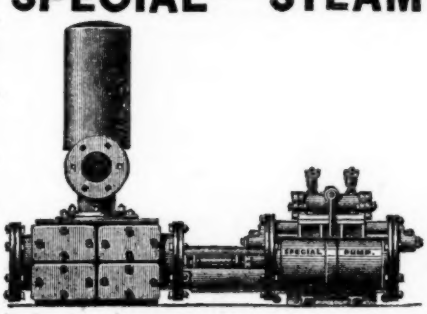
Gentlemen,—The two 24-inch and three 36-inch Hunt's Equilibrium Governors supplied by you, and fixed in the valve-rooms at Whitechapel, Goswell Road, and Blackfriars, are working very satisfactorily.

Yours truly,
(Signed) JOHN JOHNSON.

PRICES AND FULL PARTICULARS ON APPLICATION.

THE "SPECIAL" STEAM-PUMP.

Diameter of Steam Cylinder.	Diameter of Water Cylinder.	Length of Stroke.	Gallons of Water per Hour, Approximate.	Reduced Prices.
3	1½	9	450	£16
4	2	9	815	18
5*	2½	12	1,250*	20
5*	3	12	1,830*	22 10
4	4	12	3,250	25
6*	4	12	3,250*	30
5	5	12	5,070	32 10
7*	5	12	5,070*	40
6	6	12	7,330	40
8*	6	12	7,330*	50
7	7	12	9,750	50
10*	7	12	9,750*	65



In use in a Hundred Gas-Works in the United Kingdom for Pumping Ammoniacal Liquor, Water, or Tar.

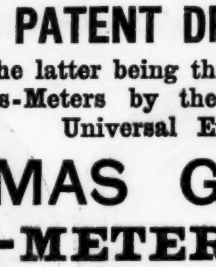
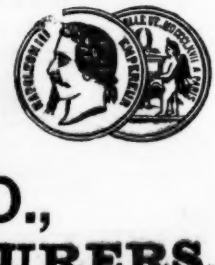
Messrs. Burt, Boulton, and Haywood, Manufacturing Chemists, have over FORTY "Special" Steam-Pumps in use at their several large Tar-Works.

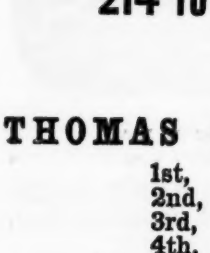
Two Hundred Sizes made. Those in Table opposite are the leading Sizes for use in Gas-Works and Chemical Works.

* These Sizes being usually selected for pumping Tar and Liquor, are always in stock, or nearly ready, fitted with all pump details in iron, and extra length distance-piece between steam and pump cylinder, at a small extra cost.

TANGYE'S HIGH-PRESSURE AND CONDENSING STEAM-ENGINES; CORNISH, VERTICAL, & TUBULAR BOILERS; HYDRAULIC AND SCREW LIFTING-JACKS, CRABS, PULLEY-BLOCKS, &c.

FULL PARTICULARS, ESTIMATES, CATALOGUES, ETC., ON APPLICATION.

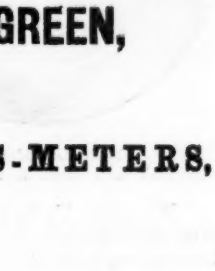
London, 1851. New York, 1853.  Paris, 1855. London, 1862. 

Dublin, 1865. 

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

Paris, 1867. 

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

LONDON, E.C.

THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS,

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON & CO.

(ESTABLISHED 1816)

ARE THE ONLY MAKERS

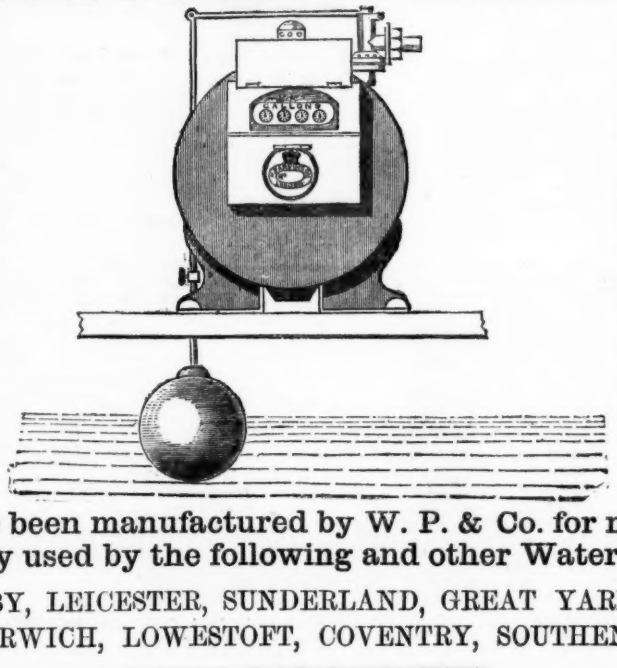
OF THE

LOW-PRESSURE WATER-METER.

These Meters will register with perfect accuracy, either at full speed, or with a few drops only passing through them.

They must be placed over the cistern to be supplied, and the water, after being measured, will fall from the outlet into the cistern below. Each Meter is fitted with a ball-valve, so made that it can be adjusted to shut off the supply at the inlet when the water reaches any required height in the cistern.

The 100-gallon Meter is fitted with a cistern holding about three or four gallons, and may be fixed inside a house, free from the effects of frost, and requires no attention after once being fixed.



From "The Engineer," April 6, 1877.

"Low-pressure Meters have been found to register with almost perfect accuracy, or, at all events, within 5 per cent. either for or against the consumer, and from the nature of their construction are by no means easily deranged. Still, even the low-pressure meters have their disadvantages, but these are chiefly as respects the question of first cost, seeing that they must have a cistern fixed at a higher level than that at which the supply is needed. All things considered, however, the balance of opinion rules at present in favour of the low-pressure Meter, and they are consequently increasing in favour as time goes on."

These Meters have been manufactured by W. P. & Co. for more than 25 years, and are largely used by the following and other Water Companies:—

NOTTINGHAM, DERBY, LEICESTER, SUNDERLAND, GREAT YARMOUTH, SHEFFIELD, NORWICH, LOWESTOFT, COVENTRY, SOUTHEND.

COTTAGE LANE, CITY ROAD, LONDON, E.C.

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

THE JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, OCTOBER 2, 1877.

Circular to Gas Companies.

We cannot agree with those who urge that there is no necessity for inquiry before legislation for the amendment of the Sales of Gas Act is proposed; but, at the same time, we may admit that the provisions required for that amendment are few and simple. There are three parties interested in the question. First, there is the general body of gas consumers, who, for the most part, understanding nothing about the construction of a meter, too often only regard it as an instrument of extortion, and these require to be assured that the meter affords a reliable indication of the quantity of gas consumed. The instances in which the integrity, as we may say, of the meter is impeached are, in reality, very few, when we take into consideration the enormous number in use; but, when a case does occur, it makes a great noise. Every consumer who reads the newspapers gets an impression that he is an aggrieved party. A general suspicion is aroused, as happens to-day, and nothing can allay it but some authoritative declaration that the meter is, in the vast majority of cases, to be depended on. That reassuring statement cannot be satisfactory to the public unless it comes from a body of Commissioners, or a Select Committee who have carefully considered the matter. The parties next interested are the meter manufacturers, who may almost be said to be on their trial. Allegations have been made, and on official authority, that in a few rare instances, by some oversight, mistakes have been made in the registering part of the apparatus. The cases have been very rare, so far as we know, and, as we have said before, these mistakes have not benefited the Gas Company who owned the meter. It is due, therefore, to the meter makers that they should have the opportunity of explaining how these accidents arise, and of satisfying the public as to their rarity. Lastly, it is due to the Gas Companies, who buy and supply most of the meters in use, that they should be allowed to establish their *bona fides* in the matter. They do not, as a rule, make meters. They replace them when they are complained of, and repair them when they are found to be defective. It is, of course, a public misfortune that the meter cannot be as accurate a measure as a quart pot, and that the works cannot be regulated like those of a watch or a clock; but we are certain that the investigation we call for would disperse all the doubts which at the present time agitate the minds of gas consumers.

When, last week, we made some remarks on the accounts of the Alliance and Dublin Company for the past half year, we had before us only a short abstract. Now that we have the full statement, we feel it incumbent on us to qualify those remarks to some extent. The balance of profit to be carried forward from the past half year is only £3076, the difference between that and the sum we named being made up by the balance of a previous half year. The small margin of profit we now see in the full statement of the accounts cannot possibly justify any reduction of price at present, and, besides that, we find that the Company have no reserve, except a contingent-fund of small amount. The Directors ought, therefore, to devote their efforts to the formation of a reserve-fund, which, in the long run, will benefit both shareholders and consumers. We have really but little to retract, but a study of the accounts, which our readers will see next week, shows us clearly that the day for a reduction of price is more distant than we supposed. All going well, however, the citizens of Dublin may rest assured that their interests as consumers will not be neglected by the Gas Company.

The report of the Directors and the statement of accounts for the past half year, to be presented to the shareholders of the Phœnix Gas Company to-morrow, constitute a very satisfactory document. The business of the Company continues to increase, and, notwithstanding the reduction the Directors have made in the price of gas, a considerable balance of profit is left, after paying full dividends, to be carried to the reserve-fund, which now amounts to the sum of £101,000. It is quite evident that the liberal policy lately adopted by this Company is having its natural effect on the business. The balance of net revenue for the past half year is £4000 in excess of the balance in the corresponding half of the previous year. We have already announced that the Directors have made a further reduction in the price of gas to 3s. 4d. per 1000 feet, all over their district, to take effect from yesterday. It was a wise and generous step, and will, no doubt, be followed by a natural consequence—an increase of consumption.

The London Gaslight Company are in a scarcely less prosperous condition. The balance of net revenue for the past half year is over £40,000, and when all preferential charges are satisfied, there remains more than sufficient to pay full statutory dividends.

The Surrey Consumers Company, with gas at 4s. per 1000, are, of course, able to divide as much as the law allows; but the accounts seem to indicate that the business of the Company does not increase at the rate it ought and might. The rental for the past half year only exceeds by about £1000 that of the corresponding half of the previous year. The balance of net revenue is, for the past half year, only £15,413, whereas last year it was £17,532. The prospects of the Company are, however, excellent, if they will only adopt the policy pursued by their neighbours. That they are disposed to do so we gather from the fact that the Chairman, at the half-yearly meeting, held yesterday, announced that from the beginning of next year the price of gas in the Company's district will be reduced from 4s. to 3s. 9d.

We do not often allude to new Companies, but may mention here the formation of the "Universal Gaslight Improvement Company," which has been formed with a view to develop the use of Aitken and Young's patented process. This process has been more than once described in our columns, and we have expressed a qualified opinion, that when a Gas Company have not a ready outlet or sale for the tar they make, the process may be employed, first, to increase, to a small extent, the volume of the gas produced, and, next, to improve its illuminating power. We have only to add that, when the tar has been employed according to the patent, it is still valuable for everything but distillation for naphtha. All other ingredients of worth remain. There is one feature in the prospectus, and it is, in fact, the one which chiefly induces us to give a notice of the Company. The projector—for he seems to stand alone—is to receive no cash payment until the shareholders receive a 10 per cent. dividend. This is an example of good faith and confidence, which is in striking contrast with some enterprises we have had occasion to notice.

We are sorry to say that the dispute between the Bristol Sanitary Authority and the Bristol United Gas Company, in reference to the charge for the public lighting, has not yet been arranged. The difference between the two bodies is, in reality, small. Some time ago the Gas Company reduced the price to private consumers threepence per thousand cubic feet, and they now offer to reduce the charge for the public lamps twopence per thousand. The Sanitary Authority contend that they have a right to a reduction equal to that made to the private consumers, and on this difference of one penny the whole hubbub arises, and Bristol is, consequently, threatened with petroleum lights.

Water and Sanitary Notes.

A REPORT of considerable interest has just been made to the Commissioners of Sewers of the City of London, by Dr. S. Saunders, as to the methods of dealing with the meat seized and condemned in the City meat markets. In the past year 238 tons of meat were seized and condemned as unfit for human food. But, although unfit to be eaten, every shred of it possesses a value, and not an atom should be wasted. It has hitherto been the practice, originated by the late Dr. Letheby, to saturate the meat, soon after condemnation, with commercial carbolic acid. The chief object of this treatment was to prevent the slightest possibility of any portion of the meat finding its way, by surreptitious means, to the sausage maker, and it must be admitted that the plan was most effectual. We shall not discuss with Dr. Saunders the value of carbolic acid, pure or commercial, as a disinfectant. We will grant at once that its value has been greatly overrated, and that its use involved a nuisance scarcely less tolerable than that it was intended to obviate. But the chief objection to its employment was, that it prevented the realization of the full value of the condemned matter. If, for example, the fat was extracted from the meat, the fat stank of carbolic acid, and the stench could not possibly be removed. Consequently, the fat—the most useful part of the meat—had no market value, and all that could be done was to make the whole mass into manure.

It has been Dr. Saunders's endeavour to find a method of treatment, which, while complying with all sanitary requisitions, would allow the full value of the constituents of the meat to be realized. We shall not stop to notice all the propositions stated. Two broad courses were put before the Commissioners; one was to sell the condemned meat to contractors, after the officers had made it unsaleable for food. The objection stated to this was, that contractors would give a very small price; and the alternative plan suggested was for the Commissioners to work up the stuff themselves, with a plant set up at the Foreign Meat Market at Deptford. An experiment has been made with an admittedly imperfect plant and unskilled labour, but the result has been very encouraging. By the sale of tallow, bones, &c., from 137 tons of condemned meat, a profit of over £200 was made. It only remains to mention the substitute Dr. Saunders has proposed for carbolic acid. It is a strong solution of "Cooper's "salts"—a mixture of the chlorides of calcium and sodium—to which is added some protosulphate of iron. This mixture acts directly as a deodorant, and preserves the meat from further change. Tank carts have been constructed, in which the meat, immersed in the above solution, is carried, without offence, to its destination at Deptford. There it is treated by processes we need not describe, and all the products are obtained in an inodorous state. As we are the determined opponents of anything like waste, we strongly recommend the Commissioners to go on with their enterprise with perfect appliances. We do not suppose that the result will much affect the City rates, but the avoidance of waste must be a substantial gain.

The accounts of the East London Water-Works Company have been issued, and they show, as a matter of course, a large balance of profit. The Directors recommend a dividend at the rate of six per cent. per annum as usual.

Mr. R. Rawlinson, C.B., in his capacity of Chief Inspector of the Local Government Board, has recently held two inquiries upon the application of Sanitary Authorities for certificates under the 12th section of the Rivers Pollution Prevention Act. At one of these, at Sandown, in the Isle of Wight, he is reported to have said that "it was *intolerable* that towns should, "for the supply of a necessary of life like water, be depen- "dent on private companies, whose sole object it was to make "as much money as they could out of the public." Will Mr. Rawlinson tell us how many Local Authorities have ever troubled themselves about the water supply, until they found a prosperous Company in their district? It is a well-known fact, that almost every water undertaking in the kingdom was originally started by private enterprise.

As we said, when the scheme was first propounded, the appropriation of Thirlmere, for the benefit of Manchester, will not pass without a serious opposition. The opponents are of two classes—one who imagine that a forty-feet embankment, and the consequent flooding of the present shores of the lake, will completely destroy the beauty of the scenery; and the other who contend that the water of the lake belongs to its own district, and ought not to be diverted to meet the wants of a distant city. The opposition threatens to be energetically conducted, and the next session of Parliament will witness a powerful struggle in reference to this question.

Review.

THE LAW RELATING TO GAS AND WATER.*

A second edition of the valuable work of Messrs. Michael and Will —indispensable to every gas and water company, and to all parliamentary agents and lawyers concerned for such companies—is just now especially welcome. Since the first edition appeared some very important changes have been made in what we may call "standard" gas legislation. In 1872 we were guided by the two general Acts of 1847 and 1871. With regard to this latter enactment and its application, Mr. Michael, in his introduction to the part of the work relating to gas, supports an opinion we have always expressed, that the decision of the judges of the Court of Queen's Bench, which ruled that companies incorporated before 1871 were subject to the provisions of the Act of that year, was bad. We have always regretted that the Commercial Company did not appeal against that decision, but the point is now of but small importance. The changes which have taken place in model gas legislation during the past two years completely overshadow the Act of 1871, important as the effects of that Act, as interpreted, may be to some companies, if the decision of the Court of Queen's Bench be upheld. We have now, and may for ever have, to submit to a sliding scale of dividend, and to provisions making the sale of newly issued shares by auction or tender compulsory. To this last feature of gas legislation, Mr. Michael has necessarily, in his parliamentary practice, been compelled to bestow especial attention, and in the work we now notice full consideration is given to the matter. The representative Acts of the Commercial Company, 1875, and the Chartered Company, 1876, are printed *in extenso*, and besides this Mr. Michael has drawn a "model Act," complying with the last Standing Orders, which will be found of the greatest use to gas companies desirous of obtaining statutory powers.

No change has taken place in water legislation since the first edition of this work was published, but the Rivers Pollution Prevention Act intimately concerns local authorities, for whose guidance and information this work is intended. Mr. Will has, therefore, very properly, in his portion of the work, given the text of the Act, with some very useful comments thereon. It is altogether unnecessary to say a word of praise for a book which, as we have said, is indispensable to every gas and water company and local authority.

REDUCTIONS IN THE PRICE OF GAS.—The Whitehaven Gaslight Company and the Whitehaven Consumers Gas Company have given notice that from the 1st inst. the price of gas will be reduced to 3s. 7d. to private consumers. On the 1st of January next the Surrey Consumers Gas Company will reduce their price from 4s. to 3s. 9d.

SCARBOROUGH WATER SUPPLY.—We (*Eastern Counties Herald*) understand that the proposed scheme for a better water supply to Scarborough is so far matured that at a meeting of the shareholders to be held shortly it will be laid before them. The new scheme contemplates obtaining the supply of water from the high end of Harewood Dale, at the source of the river Derwent, near Fylingdales, and that the water so obtained will be conveyed by pipes to near Falsgrave, where a reservoir will receive it and supply the town.

INVERCARGILL (NEW ZEALAND) CORPORATION GAS-WORKS.—The *Southland Times*, of the 7th of July last, says: "The gas-works account, presented in the balance-sheet at the meeting of the municipal council on Thursday evening, exhibits a promise that the works will, in the course of a year or two, be of a highly remunerative character. It appears the receipts for the half year were £1314 5s. 4d., the expenditure for the same period being really, after deducting the value of the stock of coals, &c., on hand, paid for during the half year, £1293 5s. 6d., thus already paying working expenses and interest on cost of construction."

LEICESTER WATER-WORKS.—At the meeting of the Leicester Town Council on Tuesday last, the Mayor, in reply to an inquiry, intimated that a meeting had taken place between certain members of the corporation and the chairman and others connected with the water-works company, having reference to the purchase of the undertaking by the town. At present no arrangement had been come to, and he must ask them to allow the matter to remain in abeyance for a short time. As soon as the time arrived when the business could be safely and properly laid before the members of the corporation, he would take the earliest opportunity of calling a meeting for the purpose.

GLASGOW WATER SUPPLY.—Dr. E. J. Mills, of the Andersonian University, Glasgow, has issued his report on the quality of the Loch Katrine water supplied to the city during September. He says: "The water was very pale brown, and contained an exceptional amount of black and other organic particles and fibres, among which some beautiful diatoms and encysted organisms were observed. Although these substances and organisms may very possibly be harmless, their removal by filtration is undoubtedly advisable. It may be remarked that climatic influences have this year denied to Lock Katrine water the high summer condition it enjoyed in 1876."

* "The Law Relating to Gas and Water, comprising the Rights and Duties as well of Local Authorities as of Private Companies in regard thereto, and including all Legislation to the close of the last Session of Parliament." By W. H. Michael and J. S. Will, Esqrs., Barristers-at-Law. Second edition. London: Butterworths, 1877.

Correspondence.

[We do not hold ourselves responsible for the opinions expressed by Correspondents.]

NORTH BRITISH ASSOCIATION OF GAS MANAGERS.

SIR,—I have read in this week's JOURNAL a letter signed "W. L.," in which certain statements are made which I feel bound to contradict, as they are both misleading and contrary to fact.

With reference to the committee's report upon the prize papers, I beg to say that no such recommendation as that imputed to them by "W. L." was either made or implied, which "W. L." must know, as he appears to have been present at the meeting when I read the report.

"W. L." must also know that, as requested by him, I, at the very earliest time possible—certainly four or five weeks ago, returned to him his paper. Were I at home, I could easily verify this by enclosing to you his acknowledgment of receipt of the same.

WM. MACKENZIE, Secretary,
North British Association of Gas Managers.

Wilmslow, Manchester, Sept. 13, 1877.

[This communication did not reach us until the 29th ult., although our correspondent informs us it was posted a fortnight previously.—ED. J. G. L.]

Legal Intelligence.

WANDSWORTH POLICE COURT.—THURSDAY, SEPT. 27.

(*Before Mr.* D'EYNCOURT.)

LAYING MAINS IN PUBLIC ROADS.

Mr. KEILEY, solicitor to the Mitcham Gas Company, attended with reference to a dispute with the Wimbledon Local Board as to laying down pipes. He said the board objected to the pipes being laid under the pavement, but required them to be put down in the road. Ever since the company had their Act they had always laid down their pipes in the footpaths, no objection being raised.

Mr. D'EYNCOURT wished to know why the pipes could not be put down in the road.

Mr. KEILEY said the road was newly made. It was necessary to have the road thoroughly consolidated, to prevent the pipes, when laid, from leaking.

Mr. D'EYNCOURT, after looking at the Act, said he supposed a summons was required.

Mr. KEILEY thought one was not required, as the Act gave power, in case of dispute, to apply to a magistrate for an authority.

The board were represented by Mr. HILL, the assistant-clerk.

Mr. D'EYNCOURT said a magistrate could not decide without hearing both sides. He granted a summons.

Miscellaneous News.

METROPOLIS WATER SUPPLY.

The following are the returns of the Society of Medical Officers of Health, on the composition and quality of the metropolitan waters in September, 1877:—

NAMES OF WATER COMPANIES.	Total Solid Matter per Gallon.	Oxygen required by Organic Matter, &c.	Nitrogen.—As Nitrates, &c.	Ammonia.		Hardness (Clarke's Scale).	
				Saline.	Organic.	Before Boiling.	After Boiling.
Thames Water Companies.	Grs.	Grs.	Grs.	Grs.	Grs.	Degs.	Degs.
Grand Junction	20·80	0·100	0·090	0·001	0·009	13·7	3·3
West Middlesex	17·30	0·048	0·111	0·000	0·009	12·6	3·0
Southwark and Vauxhall	19·70	0·110	0·118	0·002	0·010	13·2	3·3
Chelsea	21·00	0·092	0·105	0·001	0·009	14·3	3·3
Lambeth	20·70	0·079	0·130	0·001	0·009	13·7	3·0
Other Companies.							
Kent	26·60	0·010	0·268	0·000	0·002	19·4	5·1
New River	16·10	0·017	0·093	0·000	0·006	12·6	3·3
East London	20·00	0·041	0·099	0·000	0·007	12·6	3 0

Note.—The amount of oxygen required to oxidize the organic matter, nitrites, &c., is determined by a standard solution of permanganate of potash acting for three hours; and in the case of the metropolitan waters the quantity of organic matter is about eight times the amount of oxygen required by it.

The water was found to be clear and nearly colourless in all cases but the following, when it was slightly turbid, namely:—Chelsea.

C. MEYMOTT TIDY, M.B.

The New River Company have given notice of their intention to provide a constant supply of water in the parish of Shoreditch, from the 10th of December next, and have requested the Metropolitan Board of Works to specify at what places, and of what dimensions and form, they require the company to provide hydrants in the parish, in order to give the public the full benefit of constant supply.

EAST LONDON WATER-WORKS COMPANY.

The Report of the Directors to be presented to the Proprietors at the Half-Yearly General Assembly, on Thursday next, is as follows:—

The accounts for the half year ending at Midsummer last, duly certified by the several auditors, are herewith submitted to the proprietors.

The revenue from water-rates, as stated therein, is £95,310 16s. 2d.; the amount for the corresponding period in 1876 was £93,735 14s.

The expenses for maintenance and management amount to £39,427 2s. 7d., for the corresponding period of 1876 they were £37,487 15s. 11d. This increase is partially accounted for by the extra charges for rates and taxes, also for abstraction of water; in the present accounts, amounting to £12,732 10s. 11d.; in 1876 to £11,183 1s. 11d. The general establishment charges include £913 9s. 2d. for alterations and improvements in the offices at Old Ford and St. Helen's Place, required to meet the increasing business of the company.

The expenditure for capital amounts to £15,492 15s. 2d., leaving £33,478 1s. 4d. out of the amount received from the proprietors to the credit of the capital account.

The reservoir at Hagger Lane is finished, and all the other works there are approaching completion. The erection of a water tower in connexion with these works has, however, been delayed, in consequence of the difficulty in obtaining possession of the land required.

All the works of the company are generally well maintained and in good order.

The quantity of water pumped during the half year amounted to 4,542,914,689 gallons, showing an increase over the quantity pumped in the corresponding period of 1876 of nearly 300 millions of gallons. A regular and systematic inspection of the fittings of all houses is maintained to check waste, but an increase in the quantity of water pumped must necessarily in some degree correspond with the additional number of houses supplied and the increase of revenue.

The directors are happy to refer to the opinion of the Select Committee on the Metropolitan Fire Brigade, and would direct the attention of the proprietors to the 76th clause of their report, that "generally it seems to your committee that the companies cannot be charged with any failure of duty."

The directors recommend that a dividend at the rate of 6 per cent. per annum on the ordinary stock, and of 4½ per cent. per annum on the debenture stock, both clear of income-tax, be declared payable on the 10th of January next, in the usual manner.

HARROW DISTRICT GAS COMPANY.

The Half-Yearly Meeting of this Company was held on Wednesday, the 26th ult., at the Guildhall Tavern—JAMES GLAISHER, Esq., in the chair.

The following report was presented:—

The directors, in again meeting the shareholders, are able to congratulate them on the continued prosperity of their undertaking.

The receipts from the coke have not been so good as usual, the price being very low in the district, but the gas-rental has considerably increased.

The balance of the profit and loss account provides £919 0s. 1d. for disposal. The directors recommend a dividend at the rate of 5½ per cent. per annum (free of income-tax), leaving £94 0s. 1d. to be carried forward to next account.

Dr. Revenue Account, for the Half Year ended June 30, 1877. Cr.

Manufacture of gas—				Sale of gas—		
Coals, including all expenses	£1,219	17	6	Lady-day quarter—		
Purifying materials, water, oil, &c.	41	12	4	Private rental—		
Salary of engineer	100	0	0	4,695,400 cubic feet at 6s.	£1,408	12	5
Wages	198	0	3	543,300 cubic feet at 6s. 3d.	169	15	10
Works, machines, and apparatus—maintenance of, repairs, and labour	99	16	6	Public rental and under contracts	160	17	3
Distribution of gas—				Midsummer quarter—			
Mains and service-pipes, repairs, maintenance, renewal, and labour	33	3	6	Private rental—			
Meters, renewing, repairing, and refixing	14	6	0	2,461,100 cubic feet at 6s.	738	6	6
Public lamps—				253,200 cubic feet at 6s. 3d.	79	2	11
Lighting	26	1	0	Public rental and under contracts	79	16	0
Rents, rates, and taxes—				Meter-rental, half year	72	10	0
Rents	11	10	0	Residual products—			
Rates and taxes	59	4	0	Coke, less labour and cartage	335	18	9
Management—				Tar	70	1	7
Directors and auditors allowances	110	10	0	Liquor	16	12	10
Salary of secretary	25	0	0	Transfer fees	0	8	0
Collector's commission	25	0	0				
Stationery and printing	13	0	5				
General establishment charges	80	7	8				
Sundries—							
Bad debts	26	9	8				
Total expenditure	£2,083	18	7				
Balance carried to profit and loss account	1,048	2	9				
	£3,132	1	4		£3,132	1	4

The CHAIRMAN, in moving the adoption of the report, congratulated the shareholders on the presence of their engineer, whose absence, occasioned, as it was, by his illness, they had to deplore at the previous meeting. That illness continued for a period of three or four months, and the anxiety of the directors during that period might be imagined. It was, however, considerably lessened by the voluntary superintendence of the deputy-chairman, who devoted nearly the whole of his time to the business of keeping the works going in a satisfactory manner, and the board felt that a debt of gratitude was owing to him for what he did in that emergency. They had had a good deal of trouble with the coke, but had succeeded in clearing it out, and now got rid of it as fast as it was made. The sale of tar had been very small, owing to the contractor failing to remove it; 5000 gallons had, however, been removed in the previous week, and the whole stock was to be cleared out next week, and so that difficulty was removed. The gross gas-rental showed an advance of £129 over the corresponding half of last year, and he was proud to say that, during the whole six months, there had not been one complaint. He believed the consumers were becoming better educated, and began to see that a good deal depended upon themselves, and that if one light was bad and another good, the fault was not in the gas but in the burner. He was glad to find a considerable use of gas for cooking purposes, and believed that the more general this became, the better it would be for the public. Since the last meeting there had been what would be now designated a "gas scare." He had attended to electrical matters for a great many years, and, when a juror at the Exhibition of 1851, a suggestion was made with reference to light-houses, for supplying light by electricity. The expense would at that time have been so great that it was put out of the question. Since that period he had watched the improvements in electricity with great interest, and though he did not say the present mode of lighting would not be improved, yet, so far as he could see, it would not be through that agent. He was lately at Havre, where very extensive works were going on in the harbour, and these were lighted every night by electricity. He went night after night to look at the splendid light illuminating the works, so that, when the tide went down, not a moment was lost. He watched it from different positions, and could not avoid noticing the intense blackness of every shadow where there was any intervening object. Some time afterwards he was passing up the Seine, and there, from the Champ de Mars, a light was thrown across on to the Palace of the Trocadero. He could but admire its intensity and beauty, but here again was the intense and dark shadow. He made inquiries in Paris of every one he could, and the result was he could not see how in any way electricity would injure gas companies shares. The companies must be ready to improve the lighting in every possible way, and keep the vantage ground they at present possessed. He should be sorry for the shareholders to have a scare. Their property was as sound as sound could be, and his firm intention was not to part with a Harrow share. Harrow was a neighbourhood that did not increase quickly, but it might do in certain circumstances, and their shares might become, and legitimately, of double the value they were at the present moment. He hoped this was the last 5½ per cent. dividend he would have to announce; but, if the circumstances were such as to make the directors think it advisable to keep the dividend as low as 5½ per cent., they would do that which they deemed right. He moved the adoption of the report and balance-sheet.

The DEPUTY-CHAIRMAN seconded the resolution, which was agreed to.

The dividend was then declared, and votes of thanks were accorded to the directors and officers of the company for their services in the efficient conduct of the company.

SHREWSBURY GAS COMPANY.

The Annual Meeting was held on Thursday, the 27th ult.—Mr. A. G. Brookes in the chair.

The following report was presented:—

The directors herewith present their annual report to the company, together with the statement of accounts, examined and certified by your auditors.

The steady increase in the consumption of gas and the existing low price of coals have produced a good financial result in the past year, notwithstanding the unusual mildness of last winter, and its adverse influence on the sales of the residual products.

The renewal and enlargement of mains and services undertaken since last meeting, consequent on the more extended use of gas for lighting and heating purposes, have been effected economically, the present time being exceptionally favourable for such a result. A new retort-house, coal-shed, and other extensions in the manufacturing plant are in progress, capable of meeting the wants of the town and suburbs for many years to come.

Adverting to the discussion at the last general meeting as to the reserve-fund, the directors have resolved to realize as early as practicable that portion now invested in coal and sundry stores, and used as working capital, and re-invest it in Government and other securities, as prescribed in the Gas-Works Clauses Act.

Two acres of land, contiguous to the company's premises, have been secured for storage accommodation, and such other purposes as may be thought expedient. Looking at the probable demands upon your company's resources within a very short period, your directors intend to provide another gasholder of sufficient capacity to meet every contingency, and lessen Sunday labour.

Two of your directors retire by rotation at this meeting—viz., A. G. Brookes and Rev. Nathaniel Cooper, but are eligible for re-election. Your auditor, Mr. Wade, also retires, but offers himself for re-election.

The Chairman, in moving the adoption of the report, congratulated the shareholders upon the increased consumption of gas, and stated that new mains had been laid down, and that the whole of the work had been done in a very economical manner. The retort-house, having been found unsafe, had been condemned and had been pulled down, and a new one erected, which would meet their increased requirements. Alluding to the question of the reserve-fund, discussed at the last meeting, he said they intended to re-invest the amount in Government Consols. The directors intended to reduce the price of gas, and they hoped at no distant day to be able to reduce it still more.

Mr. J. H. Leake seconded the motion, which, after a brief conversation, was put and carried.

A dividend at the rate of 7½ per cent. was declared, and the retiring directors and auditor were re-elected.

Votes of thanks were given to the chairman and directors, also to Mr. S. B. Darwin, the manager, and the other officials of the company, and these having been duly acknowledged, the proceedings terminated.

ROCKHAMPTON (QUEENSLAND) GAS AND COKE COMPANY.

The Ninth Half-Yearly General Meeting was held on Thursday, June 21—Mr. H. Jones in the chair.

The Secretary (Mr. H. Mills) read the directors report as follows:—

In presenting this ninth half-yearly report, the directors have the pleasure of saying that the operations of the company during the past half year have resulted very satisfactorily for the shareholders, and that they are in a position to recommend the usual dividend of 10 per cent. per annum on the paid-up capital of the company, to be paid on the 30th of June.

The directors are pleased to state that all the shares are now disposed of, and are saleable at a considerable premium. The balance of profit, after payment of dividend, the directors propose to carry to the reserve-fund account, there being no depreciation during the half year of such a character as to require deduction from the present earnings.

A considerable addition to the company's plant is being made by a direct shipment of pipes and retorts, now in the ship *Rockhampton*, and daily expected. The cost of these goods, nearly £1000, has been paid, and is included in fixed investment. The proposed extensions are expected to yield a return during the next half year.

The difficulty of obtaining a quorum of shareholders at general meetings has more than once caused embarrassment to your directors, but with so large a number of proprietors we are bound by the company's Act strictly to that number, and can only express a hope that shareholders will attend future meetings in sufficient numbers to avoid adjournments.

It will be the business of this meeting to elect two directors in the place of Henry Jones, Esq., and John Headrick, Esq., who retire by rotation. Both these gentlemen are eligible for re-election, and have given the requisite notice. There are no other candidates. Two auditors are also to be appointed for the ensuing year.

The report of the engineer (Mr. W. Smith), appended to the report of the directors, was as follows:—

Gentlemen,—I have the honour to lay before you for your information the report of the condition and progress of your work for the past half year, together with a return of the quantity of coal carbonized, and the amount of gas sold. At the same time, the whole of the works have been maintained in excellent order and condition. There has been a considerable addition to the number of consumers, giving an increase of consumption over the corresponding half year for 1876. The quantity of coals carbonized has been 203 tons, and the amount of gas sold 1,847,560 cubic feet, of the illuminating quality of 15 sperm candles. The sales of coke and tar are still increasing. The ship *Rockhampton*, with the material for our extension, has not yet arrived, causing much delay in the extension of the mains.

W. Smith, Managing Engineer.

Balance-Sheet for the Half Year ended May 31, 1877.

Dr.	*Profit and Loss.*			*Cr.*		
Manufacture, distribution of gas, and management	£816	8	0	Balance, Nov. 30, 1876	£603	12	10
Discount on gas-rents	65	9	3	Sales of gas, coke, and tar	1666	4	0
Dividend, Dec. 23, 1876	586	9	6	Scrip and transfer	3	19	0
Reserve-fund	17	3	4	Rent of dwelling-house	22	10	0
Profit this half year	846	0	10	Interest	11	0	
				Re-sale of forfeited shares	34	14	1
	£2331	10	11		£2331	10	11

Liabilities and Assets.						
Capital	£15,000	0	0	Fixed investments	£12,697	13	4
Less due from shareholders on preference shares not called up	2,194	7	3	Floating investment (coal, coke, and tar)	292	3	9
	£12,805	12	9	Sundry debtors	461	12	3
Unclaimed dividends	19	5	8	A. J. S. Bank	235	12	3
Reserve-fund	17	3	4	Cash in hand	1	1	0
Profit and Loss	846	0	10				
	£13,688	2	7		£13,688	2	7

The Chairman moved that the report and balance-sheet be adopted.

Mr. Hall seconded the motion, and it was carried.

The retiring directors, Messrs. Jones and Headrick, and the retiring auditors, Messrs. Jackson and Bushel, were severally re-elected.

This concluded the formal business, and a vote of thanks to the chairman and directors was adopted.

The Chairman, in replying, said he never worked with greater pleasure. He was sure the shareholders could not have chosen a better board; the great advantage in so new a company as the present being the full quorum of attendance at meetings whenever business had to be transacted. He begged to thank them, on behalf of himself and the directors, for their cordial vote of thanks.

The meeting then terminated.

CITY OF MELBOURNE (AUSTRALIA) GAS COMPANY.

The Twenty-seventh Annual Meeting of the Shareholders of this Company was held on Friday, July 20—Thomas Moubray, Esq., J.P., in the chair.

The Secretary (Mr. John Scott) read the report and accounts as follows:—

The usual statements of account for the half year ending June 30, 1877, are herewith submitted.

The profit and loss account shows a credit balance of £9863 0s. 2d.; from which a dividend is now declared of 6 per cent. per annum, making £7500, leaving to carry forward the sum of £2363 0s. 2d.

Your directors have to report that negotiations which had been for some time pending between the respective boards of directors of the Collingwood, Fitzroy, and District Gas and Coke Company, the South Melbourne Gas Company, and this company, have resulted in an arrangement to amalgamate the respective undertakings. The terms of this arrangement will be submitted for the approval and confirmation of the shareholders of the respective companies at their special general meetings to be held for this purpose, on Monday, the 13th of August, and thereafter the sanction of Parliament will be sought in the promotion of a Bill to give effect to the agreement.

The works in connexion with the out-station gasholder, to improve the supply south of the Yarra, are approaching completion, and operations generally during the past half year have proceeded with smoothness and regularity.

You are this day called upon to re-elect as directors John Ben, Isaac Hart, and R. Twentyman, Esqs., who, being eligible, offer themselves accordingly.

Dr.	*General Balance-Sheet, June 30, 1877.*			*Cr.*			
Capital account	£250,000	0	0	Land, buildings, and apparatus	£314,584	2	10
Debentures	30,000	0	0	Apparatus in store	7,535	6	5
Interest on debentures	750	0	0	Gas-meters	20,082	5	7
Debenture redemption-fund	22,073	15	5	Coal in store	3,399	12	3
Insurance account	4,005	3	9	Coke in store	250	0	0
Meter replacement account	4,500	0	0	Gas-rates due to the company	15,018	15	3
Contingent account	19,545	9	6	Sundry sums due to the company	1,703	6	6
Bills payable	1,000	0	0	Commercial Bank, June 30, 1877	9,742	19	4
Unclaimed dividend account	740	13	3	Cash on hand, June 30, 1877	263	1	10
Sundry sums due by the company	8,262	19	7				
Wear and tear account	21,838	8	4				
Profit and loss, as per statement	9,863	0	2				
	£372,579	10	0		£372,579	10	0

Profit and Loss Account, for the Half Year ending June 30, 1877.						
Coal carbonized	£22,500	11	10	Gas-rates	£39,917	7	0
Coal used for fuel	46	17	5	Residual products—			
Cost of purifying	950	9	6	Coke sold	5,426	1	11
General charges—				Tar, &c., sold	3,942	2	4
Directors allowance	300	0	0				
Auditors fees	21	0	0				
Salaries	1,913	13	0				
Management of works, inspector's & timekeeper's wages	1,035	14	9				
Stokers and labourers wages	4,074	11	3				
Lamplighters, &c.	1,509	17	0				
Rent and taxes	810	0	10				
Subscriptions and donations	39	8	0				
Law expenses	14	5	6				
Cartage	501	8	3				
Water, travelling expenses, and sundries	460	8	10				
Stationery, printing, advertising, &c.	204	9	8				
Bad and doubtful debts	903	1	4				
Fines, overcharges, &c.	75	9	9				
Material used—							
Oil, engine packing, &c.	71	6	2				
Coal and coke sacks	57	3	9				
Wear and tear account	5,000	0	0				
Interest on debentures for half year	750	0	0				
Balance	8,045	14	5				
	£49,285	11	3		£49,285	11	3
				Balance at credit of profit and loss, Dec. 31, 1876	£9,317	5	9
				Amount required to pay dividend to Dec. 31, 1876	7,500	0	0
					£1,817	5	9
				Balance as above brought down	8,045	14	5
					£9,863	0	2

Receipts and Expenditure.						
Gas-rates	£37,024	2	3	Apparatus, &c.	£8,047	7	6
Residual products—				Stationery, printing, and advertising	240	18	9
Coke	5,271	0	0	General charges	11,014	17	8
Tar, &c.	3,830	6	5	Repairs	1,795	14	9
Deposit account	8	10	0	Coal purchased	20,425	9	5
Interest account	120	0	0	Lime purchased	694	1	9
Commercial Bank, Dec. 31, 1876	13,700	13	2	Dividends paid shareholders	7,236	4	1
Cash on hand, Dec. 31, 1876	256	3	3	Interest on debentures	759	0	0
				Commercial Bank, June 30, 1877	9,742	19	4
				Cash on hand, June 30, 1877	263	1	10
	£60,210	15	1		£60,210	15	1

The Chairman, in moving the adoption of the report, stated that he thought the result of the half year was tolerably successful, and enabled the directors to declare the usual dividend. The works and plant were kept in thorough repair and efficiency. The gasholder on the St. Kilda Road was rapidly approaching completion, and would soon be in operation. With reference to the contemplated amalgamation of the three companies, the shareholders would doubtless have observed that an arrangement to effect that object had so far progressed that the shareholders would, on the 13th of August next, be asked to consider and sanction the terms of agreement before promoting a Bill in Parliament.

Mr. M. Benjamin seconded the resolution, which was put and carried unanimously.

On the motion of Mr. R. Schlesinger, seconded by Mr. Mellis, the retiring directors, Messrs. John Ben, Isaac Hart, and Richard Twentyman, were re-elected directors of the company.

Mr. R. Hicks proposed, and Mr. Mellis seconded, the re-election of Messrs. R. Cohen and H. N. Hull as auditors, which was carried.

A vote of thanks to the directors was adopted, on the motion of Dr. Paley, seconded by Mr. Schlesinger.

The Chairman having briefly acknowledged the resolution on behalf of his colleagues and himself, the meeting terminated.

The Thirty-third Half-Yearly Meeting of the Collingwood, Fitzroy, and District Gas Company was held on July 25—Mr. George Jameson (chairman) presiding. The directors reported that the business of the

half year had, on the whole, been satisfactory, considering the low price at which gas had been sold in a considerable portion of the district supplied by the company. The price from the 30th of June last had been fixed at a uniform rate, throughout the city, of 7s. 6d. per 1000 feet. Steps had been taken to consolidate the interests of the shareholders of the three companies into one, with satisfactory results, and the shareholders would be called together on Aug. 13 to consider, and, if approving, to give effect to the negotiations which had taken place. The report and balance-sheet were adopted, on the motion of the Chairman, seconded by Colonel Stephens. A dividend at the rate of 5s. per share was declared on the profits of the half year.

NOTTINGHAM CORPORATION GAS SUPPLY.

At the Meeting of the Nottingham Town Council on Monday, Sept. 24—the MAYOR (Mr. J. W. Bowers) in the chair—the Finance Report of the Gas Committee, which was published in the JOURNAL of the 4th ult., page 378, and the following report on the proposed extension of the gas-works were presented:—

The Gas Committee report, with reference to the subject of the purchase of land at Eastwood for a future extension of the gas-works in that district, to enable a better supply of gas to be provided at Kimberley, Awsworth, Brinsley, Eastwood, and the towns and hamlets in the north-western portion of the gas district, that for a considerable time past there has been a great deficiency of gas at Eastwood, and your committee have been totally unable to comply with the increased demands for gas, or to give an efficient supply to such places as already have gas laid on.

The whole subject was referred by your committee to your engineer some time ago, and his report was circulated amongst the council in October last.

Two or three methods of dealing with the question were submitted by the engineer, one of which was to erect a temporary gasholder at Hill-Top, and collect and store the gas during the day, in order to distribute it in larger quantities at night. Another was an extension of the gas-works, by the erection of a new manufacturing station in some convenient place at Giltbrook or Eastwood. A third plan was to enlarge the gas-main to Eastwood, and to increase the manufacturing power at the Basford works. The first plan was recommended as the quickest way of getting out of the difficulty, but was admitted to be but a temporary expedient.

The district is increasing in population at a very rapid rate; and, looking to the fact that it will be impossible to provide for the ultimate necessities of the north-western portion of the gas district, with due regard to economy, without erecting new works, your committee have considered the propriety of at once purchasing land for the purpose. They have had the opportunity of acquiring 12 acres of land or thereabouts at Eastwood, from Mr. Charles Toplis, and they have accordingly purchased the same. The land is situate at the bottom of the hill on the south-west side of the town of Eastwood, and consists of a field which is in every way adapted for future gas-works. It is bounded by the Great Northern Railway on one side, by the canal on another, and by the public highway on the third side; and as regards levels and the economical distribution of gas, is most favourably located.

It will be necessary either to apply to the Board of Trade for a Provisional Order, or direct to Parliament for an Act, before the land can be used for either the manufacture or storeage of gas. Your committee, therefore, recommend that application should be accordingly made during the next session for the requisite powers, and they advise that your committee should be empowered to give the necessary parliamentary notices.

The lands at Giltbrook and Awsworth, on which the manufacturing works belonging to the corporation now stand, should also at the same time be scheduled, in order that parliamentary rights may be secured for either the manufacture of gas or the conversion of residual products on those sites.

Alderman THACKERAY, in moving the adoption of the finance report of the Gas Committee, said they had great satisfaction in finding, at the end of their financial year, that they had such a considerable balance of profit on hand. It fully justified their recommendation that the price of gas should be reduced by 2d. per 1000 feet. That was certainly very satisfactory, taking into consideration the depressed state of the staple trades in the Nottingham, lace and hosiery. Notwithstanding that depression, there had been during the last year a great increase in the number of meters fixed—no fewer than 1650 in that period—showing that the domestic consumption of gas had greatly increased. The proposed reduction would bring down the price of gas to the lowest sum ever charged by the old gas company, 2s. 8d., and this was only levied for a very limited period. He had been informed the other day by Mr. Wilson that there were in Nottingham a greater number of consumers than in any other place in the kingdom where the same quantity of gas was produced, either by the corporation or a company. During the past year they had erected a new gasholder at the East Croft, and completed the sheds for storing coke. Now, therefore, that the coal was all under cover, there was no necessity for further extensions at East Croft. At Radford they had erected four new gasholders in place of the four old ones, thereby doubling the storeage capacity of the works. They had also built a new chimney, a new engine-house, an exhauster-house, new purifying plant, and the retort-house had been reconstructed. He mentioned these alterations in order that the council might see that the committee had not, in order to secure a favourable balance, been restricting their operations in the way of improvement. When the alterations to which he had referred were completed, the works at Radford would be as effective as any other portion of the establishment now under the supervision of the council. At Basford a new gasholder had been in operation for some time past, also a new workshop for building waggons, so that by making all their waggons themselves they saved a considerable item of expenditure. The workmen's dwellings were also completed, and were being rapidly taken possession of by occupants. The surplus, it was proposed by the committee, should be carried to the reserve and sinking fund, which would then amount to £33,145. He thought it was desirable that the reserve-fund should, from time to time, be augmented, because scientific men were trying to discover some means of lighting towns which would supersede gas. It was very satisfactory to know that the officers and servants connected with the gas department had given entire satisfaction, and that during the past year there had not occurred a single circumstance of which the committee could complain. The amount of gas consumed from the 1st of July till the 18th of September this year was 1,647,000 cubic feet in excess of that consumed during the corresponding period last year. One item was not so very satisfactory, and that was waste, which had increased to the extent of 12½ per cent. The increased storeage of gas during the year amounted to 1,130,000 feet, and altogether they had storeage for 3½ million feet, which was 75 per cent. of their daily producing power.

Mr. SIMPSON, in seconding the motion, congratulated the council on the prospect of having a further reduction in the price of gas, which, he thought, reflected great credit on the Gas Committee. It would be in the recollection of some of the older members of the council that they had always opposed any attempt on the part of the gas company to extend their works into the rural districts; and amongst those who had taken an active part in the contests of those days were Alderman Barber, Alderman Howitt, and Alderman Thackeray, who fought hard against the proposed extensions to the outlying districts. The views of the council had now undergone a change as regarded the desirability of extending the supply of gas to places which were within the newly extended borough, though not within Nottingham proper; and he thought the committee had in all respects acted judiciously.

Mr. GILPIN said it had been argued that the council should reduce the price of gas to the residents in the outlying districts in the same proportion as they reduced it within the old limits of the borough. They had been willing to deal very generously with the places which would come within the extended borough of Nottingham; but he would suggest for the consideration of the council the question whether it would be desirable to continue in future to reduce the price of gas to the outlying districts in the same proportion as the old parts of the borough, because it appeared to him that the risk of leakage was greater when the gas was extended beyond the present limits of the town. He would suggest that some alteration should be made in the present agreement with the outlying districts.

The finance report of the Gas Committee was then confirmed.

Alderman THACKERAY next moved the adoption of the report as to the proposed extension of the works. He said it conveyed everything that he could say, and he did not see anything to add or explain. In answer to Mr. Gilpin, he might remark that by their Act of Parliament they were bound to supply the outlying districts on the same terms as Nottingham; but the extension of the borough now embraced so large a portion of the outlying districts that really it was hardly a matter worthy of consideration that they should make a difference against the other portions beyond the borough. They must also consider this. Take, for instance, Eastwood and the line to the west of that colliery district. The population increased there most rapidly, and it was a fact that the committee could not supply them with the gas which they ought to have. But the committee were bound to supply them, and it was a question with them whether to deal with the matter, or whether they should go to Parliament and lay down at Eastwood, in a most favourable position, the nucleus of a gas-works. In the first instance, probably they would only put down a gasholder, and send the gas through the pipes during the day, so as to be distributed at night. But they could only carry on in that manner for a short period, and in two or three years the pressure upon them would be so much increased that they would have to set up independent works. He had great pleasure in bringing forward the report, and he trusted the council would carry out all that the committee recommended.

Alderman BARBER seconded the motion. It had been mentioned that the committee were adopting a new policy by extending the scene of their operations, but he wished to say that the policy of the Gas Committee was that pursued by the council for a great many years. The committee were not proposing to extend the district one single yard; but under penalties they were bound to supply the district, and unless they took steps to do this more effectually they had been threatened to be proceeded against, and penalties obtained against them. There never had been a wiser step brought before the Council or the Gas Committee than the securing of this land, which had been obtained at a small price, was in a most eligible situation, and there was not the slightest doubt that in the end it would be found to be extremely remunerative to the council.

Alderman HOWITT, in reply to a question, said the committee were obliged to purchase the whole of the 12 acres, which were situated most eligibly, being surrounded by the railway, the highway, and the canal. It was not expected or contemplated by the Gas Committee that they would want the whole of the land. They could sell a great deal of the frontage, and still have as much as they wanted. He believed the price paid was £225 per acre. He was quite satisfied, from the arguments contained in the report, and those which Alderman Thackeray had just referred to, that the committee had done the right thing. He believed a great deal of the leakage which had been referred to arose from the length of pipe and the high pressure of the gas during the time of supplying Eastwood. He had no doubt at all that the council would confirm the judgment of the committee.

After considerable discussion as to whether or not the Gas Committee should have purchased the land without first obtaining the sanction of the Council, and as to the price which was paid for it,

Alderman THACKERAY said he was sorry that anything like party feeling should be thrown into this question. He did not for a moment accuse his opponents of speaking and voting upon party grounds, but some of them were clearly wrong in that matter, because the committee came openly to the council for their vote. If they chose to reject what the committee had done, they could do so. He had no fear whatever, supposing they threw out the report, with respect to the land, because it was worth more than was given for it. He knew that if the council did not avail themselves of the opportunity which offered itself, they would have missed a chance of securing what would be a great advantage to them. These works involved a great deal of expense, and the committee were anxious to do their best for the interest of the town. It was not wise to try and thwart their proceedings. This was probably the last time he would have to move the adoption of a report of that sort, and he must say that the magnitude of the works was not thoroughly understood. Mr. Hawksley said that to carry them on they must double their capital every 10 years. Mr. Wilson did not say quite so much, but said 12 years. In 12 years they must spend a million of money. As for the quantity of this land, they were obliged to take the whole; they could not buy a portion of it to put the gas-works on; but if it were necessary to part with it, or any portion of it, they could get a deal more than they gave for it. He trusted that there would be an unanimous vote upon the question.

The motion was then put, and carried without dissent.

MANCHESTER CORPORATION NEW GAS-WORKS.

During the autumn of last year we described at some length, and illustrated by numerous engravings, the several competing plans which had been sent in to the Corporation of Manchester for the extensive new gas-works they propose to erect near Philip's Park. We understand that the foundation-stone of these works, according to the accepted design, will be laid with some ceremony on the 10th inst., and we extract from the *Manchester Guardian* the following interesting particulars of this important undertaking:—

"The excavations for four gasholders have been in progress for many months. The work was commenced by the late Mr. Edward Johnson, to whom the contract was let about 12 months ago, and it will be carried through by his executors. The four tanks—each 153 feet in diameter and 26 feet deep—are intended to receive four three-lift telescopic gasholders, to contain together about 7 million cubic feet. Foundations for the first pair of retort-houses—each of which will be 362 feet by 70 feet, with covered cannel stores between, 45 feet wide—are now being prepared. These retort-houses will hold 536 single retorts, 10 feet long, which will be fixed in double lengths and charged at each end, and so arranged that hydraulic charging machinery may be used. The other works in progress consist of a canal basin, in connexion with the Ashton Canal, which will be convenient for conveying coal and cannel to the works, and conveying from them the various bye-products—tar, ammonia, and coke. The works will be erected in four sections, each independent of the rest; and each, when in full operation, will yield a maximum supply of 5 million cubic feet of gas every 24 hours. Amongst the improvements to be introduced in these works will be the hydraulic stokers, which have already been tested with good results at the Rochdale Road works. The river wall which is to protect the new establishment against any possible irruption of flood water from the Medlock is now nearly completed. It is a solid and most substantial piece of masonry, and has cost the corporation upwards of £20,000.

"The site occupied by the new works covers an area of 37½ acres, and the cost to the town of the establishment, land included, will fall little, if at all, short of £800,000. The undertaking is a gigantic one; but those who

recollect the scarcity of gas during the last week of 1874 will commend the prudence of the corporation in establishing works which will enable them to meet any possible demand for the future. The quantity of gas produced in the year 1844, when the corporation commenced the manufacture, was 248 million cubic feet, and the price was 6s. per 1000. Ten years later the quantity produced was 582 millions, and the price 5s. per 1000. In 1864 the production had risen to 970 millions, and the price stood at the end of the year at 3s. 6d. In 1874, 1778 million cubic feet were produced, and the price, which at the beginning of the year had been 3s. 4d., was raised in the latter half of the year to 3s. 8d. This year the price is again 3s. 4d., and the production at the several works now belonging to the corporation is at the enormous rate of 2068 million cubic feet per annum. The price was lowest in the years from 1865 to 1872, being then only 3s. 2d. per 1000 feet.

"On the occasion of laying the foundation-stone on the 10th of October, a number of gentlemen will be invited to meet the members of the city council at a luncheon in the town-hall. We understand Mr. Moon, the chairman of the London and North-Western Railway Company; Sir E. W. Watkin, M.P., chairman of the Manchester, Sheffield, and Lincolnshire Company; and also the chairmen of the Midland, the Lancashire and Yorkshire, and the Manchester South Junction and Altrincham Companies, will be present. After inspecting the existing works in Gaythorn and Rochdale Roads, the committee and their guests will proceed to the site of the new works, where at four o'clock Mr. Alderman Hopkinson, the chairman of the New Works Sub-Committee, will lay the stone. The luncheon will be served in the banqueting-room of the town-hall at half-past five o'clock. Alderman King, chairman of the Gas Committee, will preside, and he will be supported by the mayor and other gentlemen."

THE RECENT FATAL ACCIDENT AT THE REGENT ROAD GAS-WORKS, SALFORD.

The adjourned inquest on the body of William Bate, 52, smith's striker, who was killed by the accident at the Corporation Gas-Works, Regent Road, on the 3rd of September, was held last Wednesday, at the Salford Town-Hall, before Mr. F. PRICE, coroner

At the previous inquiry, a report of which was given in the JOURNAL of the 11th ult., it was stated in evidence that the explosion occurred in the old exhauster-house, and that the deceased, who was in the smithy adjoining, was killed by the falling upon him of a bar of iron which had been displaced from a rack by the shock of the explosion.

Mr. *Samuel Hunter*, engineer and manager of the works, said that the works at Regent Road were in charge of two station foremen, who acted under his directions, John Butterworth being the one in charge on the day of the explosion. On that day he (witness) was away from home, but returned in the course of the afternoon, and at once made an examination of the works. He found everything in proper working order between the retorts and the exhauster, so came to the conclusion that the explosion had taken place in the old exhauster-house. He first examined the syphon there, and found it filled with water to the proper depth, so that no gas could then escape. The syphon was capable of resisting a pressure of 21 inches. The stop-valve in the old exhauster-house was closed, and this would have the effect of preventing the gas coming from the scrubbers to the syphon in that direction. There was a back pressure from the purifiers upon the syphon of about 9 inches. He examined the pipes and valves between the retorts and the exhausters, and found everything in proper working order. From his examination and the information he had obtained from the workmen, he had not the slightest doubt that the gas which exploded escaped from the syphon into the old exhauster-house. That escape was caused, in his opinion, by the displacement of some of the water in the syphon in consequence of excessive back pressure of the gas, and the back pressure would be owing to a large volume of gas being thrown upon the inlet of the purifiers. He was unable to account satisfactorily for the cause of the excessive pressure; but he could suggest several different theories. In his opinion, the purifiers were not capable of resisting a sudden excessive pressure of gas. The opening of the valve between the retorts and the condensers might, in the event of there being an aperture or fracture in the pipes nearer to the retorts, have the effect of drawing air into the pipes, and so causing extra pressure that would affect the inlet of the purifiers or the syphon where the escape occurred. After the explosion he was informed by Butterworth, one of the foremen, that, on going to dinner at twelve o'clock on the day of the explosion, he opened the valve in order to form a connexion between some additional retorts, that were to be charged at one o'clock, and the exhauster. This work was necessary either at twelve or one o'clock; though he had been informed that the retorts had not been set to work at the time of the explosion. There was a screw plug on the pipe between the valve and the retorts, and that plug was securely fixed when he examined it on the 3rd ult. He had been informed by Butterworth that he suspected that the aperture in the pipe where the plug was fixed must have been opened on the day of the explosion. He (witness) thought the gas might have ignited at a gas-jet in the exhauster-house or at the boiler fire in the adjoining building.

In answer to questions by the JURY, he said the buildings were old, and were being replaced as quickly as possible by buildings of a more modern construction. He had apprehended all that had occurred, and had determined to dispense with naked lights and syphons altogether in the new building.

By the TOWN-CLERK, who attended to watch the proceedings on behalf of the corporation: Since he was appointed manager steps had been taken to enlarge the purifying-houses, and to remedy the defects he had pointed out. Plans had been sanctioned by the council, and the works had been in progress for some time. He wished to say that the general conduct of the foreman, Butterworth, was as nearly perfect as possible. He was a most energetic, painstaking, and experienced man, and there was no want of care or thought on his part.

John Butterworth, said that he had been foreman at the Regent Road Gas-Works for the last 14 years, and was in charge of the works on the day of the explosion. Immediately before going to his dinner at twelve o'clock, up to which time all was right, he opened a valve at the end and outside of the retort-house, to enable the gas from 28 retorts which were intended to be charged at one o'clock, to pass along the pipe to the condensers. He did not previously ascertain whether the plug used for closing an aperture in the pipe on the inside of the retort-house was in its place or not. He did not know when the plug was last taken out. The valve he opened had been closed for three or four months. After he had been home half an hour, the engine tenter came to him and said that there was something wrong in the works. He at once returned, and found that gas was escaping from the syphon in the lower engine-house, or old exhauster-house, in a large volume. He could not say whether the gas-jet near the wall was burning or not, but he was informed that it was put out in the morning. On his way to the old exhauster-house he closed the valve which he had opened before dinner. He obtained assistance, and filled the syphon, which was nearly empty, with water. It should have contained from 21 to 23 inches of water. The explosion occurred in two or three minutes after his return, the exhauster-house being completely filled with gas. There must have been a back pressure from the purifiers greater than the syphon was capable of bearing, but he was unable to state the cause, or whether the opening of the valve had anything to do with it; neither could he form any opinion as to the cause of the pressure of gas which forced the water out of the syphon, and so allowed an escape of gas. He examined the syphon a month previously. Before going to dinner on the day of the explosion, he made an arrangement for changing the purifiers at one o'clock, but this had not been done before the explosion happened. He did not remember whether the gas-jet in the exhauster-house was burning or not when he returned from dinner; if it had been lighted, he thought that the escaped gas would have ignited sooner than it did.

Mr. *Hunter*, recalled, said that, on further consideration, he thought it was possible that air might have been drawn through the hydraulic main from the retorts alluded to, and so become mixed with the gas passing to the exhausters, causing the back pressure he had previously spoken of.

Harry Jones deposed that he was a steam-engine driver at the Regent Road works. On the 3rd inst. he was in his engine-house attending to his engine, which was working. Between twelve and half-past twelve he noticed from the pressure-gauge that the pressure of gas was increasing rapidly. He could tell there was an escape of gas, and he ran for Butterworth, leaving his engine working. At that time he did not know where the escape was from, or what was its cause. He had returned with Butterworth, and fetched one bucket of water to the syphon, when the gas exploded. When he saw the pressure rising he, as was right, increased the speed of his engine. When the pressure increased it was usual to change the purifiers.

In reply to a JURYMAN: The increased pressure could not have been going on many minutes before he fetched Butterworth.

John Kendall, labourer, stated that on the day of the explosion he was engaged in making some alterations to pipes in the new No. 2 retort-house. He was not aware that he was in the No. 1 retort-house for any purpose that day. He had just finished his dinner in No. 2 when Butterworth called to him to bring a bucket of water. He brought the water and put it in the syphon, and then the explosion took place. He thought it was a week or ten days before the accident that he had done any work in the No. 1 retort-house. He denied all knowledge of any such pipe or hole or plug in the No. 1 house as had been mentioned by the previous witnesses. He had had nothing to do with any such pipe or plug.

The CORONER intimated that this was all the evidence for the jury. The only other person who could tell them anything about the matter was a man who put water in the syphon, and who could give no better evidence than they had before them. If any gentleman wished to put any question to Mr. Hunter he was at liberty to do so.

Mr. GOODWIN (one of the jury) asked whether, in the event of the hole in the pipe being open, it would draw in enough air to overcharge the pipe, seeing that it was only a 2 inch hole, but an 18-inch pipe.

Mr. *Hunter* replied that it would not, unless the engine was running at the time at great speed. No calculation upon that point could be made unless the speed at which the engine was going was known. He thought it was a very proper thing for Butterworth to open the valve. He was of opinion that the weight of evidence was in favour of the assumption that any extra pressure upon the syphon came from beyond that valve. He hoped the corporation would be accorded the credit of having foreseen this. Works for the improvement of the place were in progress, and any recommendation the jury might make was forestalled.

The CORONER then proceeded to sum up. He in the first place referred to the evidence given at the first sitting, the effect of which was that at the time the explosion occurred in the exhauster-house the deceased was in the adjoining building, the smithy, and that the cause of his death was the falling upon him of two heavy bars of iron which had been displaced from their original position by the force of the explosion. With respect to the cause of the explosion, he gave it as his opinion that the plug which had been mentioned was in its place, and that the jury must look elsewhere for the inlet of air. There seemed to him to be no verdict but one of accidental death. Any question of manslaughter was out of the question, and the extreme to which to go would be a verdict of censure.

The JURY returned a verdict of "Accidental death," adding that they were of opinion there was no satisfactory evidence to show how the excessive pressure of gas which caused the explosion was produced.

POLLUTION OF RIVERS PREVENTION ACT.

On Monday, the 24th ult., the first official inquiry under the provisions of this Act was held at Canterbury, before Mr. R. RAWLINSON, a Local Government Board Inspector, upon an application of the Canterbury Town Council for a certificate under the above-mentioned Act, to the effect that the means used by them for rendering harmless the sewage matter flowing or carried into the river Stour, from their sewage outfall at Fordwich, were the best or only practicable and available means in the circumstances of the case. The Town-Clerk applied for the certificate, and it was opposed, on behalf of the Commissioners of Sewers for East Kent who keep clear the watercourses in that part of the county, by Mr. Douglas Kingsford, barrister.

Mr. *J. G. Hall* (the city surveyor) described the process at present in use for purifying the sewage previous to its being discharged into the river, which consisted simply of passing it through layers of faggots, gravel, and flints. He admitted that the water for a short distance down the river below the outfall was often discoloured, but added that when the water was at times darker than usual, it was caused by the discharge from the tanneries and dye works in the city; he, however, maintained that for all practical purposes the method was a success.

Colonel *Cox*, a resident in the neighbourhood of the outfall, described the river as being very foul, owing to the discharge of sewage, while the stench arising from the sewage matter floating down the stream was abominable.

Mr. *Slater*, one of the expenditors of the valley, was next called, and put in several written reports showing the state of the river at various periods, from which it appeared that there had frequently been large deposits of thick black sewage in the stream. One report showed that the blow boat on one occasion was employed six weeks in cleansing the river, and the expense was £41. One of the men was subsequently stricken down with typhoid fever. The fish were destroyed.

The INSPECTOR said, with regard to illness alleged to be caused by the foulness of the river, he could point to several rivers in England which were a hundred times more foul than this one, and he had failed to trace a single case of typhoid fever to the smell from any of those rivers.

A man named *Sladden*, who had been on the river for 50 years, said up to the time the sewage came into it the water was always clear and fit for drinking purposes, for which it was largely used. They used to be able to cleanse the river in six weeks, but could not do so now, owing to the foul state of the bed. There was a thick sediment in the bed of the river, and the stench was very great. This was so for a distance of eight miles. Last summer he was stricken down with typhoid fever, caused by the sewage, and nothing else.

Dr. *Robinson*, Medical Officer of Health for East Kent, said he represented the Bridge and Blean Rural Sanitary Authorities. The sewage outfall was in the Blean district. He produced a memorial signed by all the principal inhabitants of Fordwich, addressed to the Rural Sanitary

Authority, complaining of the state of the river at the outfall. He made an investigation, in 1874, into the state of the river at the outfall, and his report was put in. On the previous Saturday he went down to the outfall, and found a thick black mass of matter going into the river. He also went to the sewage works, and found the system carried on there simply a rough mode of filtration. There was no attempt at precipitation, irrigation, or purification, as might be done. He should not like to say that typhoid fever was caused directly by the stench from the river, but there had been many complaints from the inhabitants of Fordwich of the smell, and it was only reasonable to suppose that the germs of typhoid poison were carried from the sewage into the air.

Mr. *Frederic Beard*, surveyor, said he had been inspecting the sewage farm at Doncaster for the last four years. Doncaster was situated very similarly to Canterbury in regard to its sewage. There was land on all sides of Canterbury capable of receiving sewage for irrigation purposes, both on account of its soil and position. By going three miles from Canterbury he thought land could be had for £60 or £70 per acre. What he would suggest would be that the council should hire a farm and sell the sewage to the farmers in the neighbourhood. The acreage necessary for irrigation in Canterbury would be about 250 acres. The present works might be utilized for a pumping station.

The Town-Clerk then called

Mr. *William Weir*, who said he had occupied a farm close to the sewage works, and his house was as near as Colonel Cox's to the works. He had never experienced any nuisance, or noticed any stench. When the works were flooded the water came right on to his land, but he never had any sediment from the sewage; he should have been glad of some.

This was the whole of the evidence, and the inspector intimated his intention of personally inspecting the sewage works and the outfall.

The inquiry then terminated.

On Wednesday last Mr. Rawlinson opened an inquiry, under the provisions of the Act, at Sandown, Isle of Wight, the local board of that town having applied for a certificate under the 12th section, to the effect that the means used by them for rendering harmless the sewage matter flowing or carried into the river Yar from their sewage outfall works were the best or only practicable and available means under the circumstances of the case.

Mr. *Wooldridge* (the clerk to the local board) stated that the sewage was conveyed to two tanks at Lower Sandown, where it was strained, the solid matter being collected and afterwards removed, and the effluent water, after being filtered and purified, was conducted by the main sewer into the river Yar, which no doubt long before it reached their outfall works took a considerable amount of sewage matter, and therefore they might conclude that even above the outfall the water could not be used for domestic purposes. Persons had no need to use it; they were supplied from their own wells. The district was supplied with water by the Isle of Wight Water-Works Company, and with gas by a private company. He believed it would be urged by the opposition that cattle had been injured by drinking the water of the river, but it was a strange fact that no case of the kind had been reported to the board. The cattle fed on the marshes through which the river passed were noted for their splendid condition, and for producing some of the finest beef in the island. This system had been in operation since 1860, and substantially no complaints had been made until a comparatively recent period, when the board—foolishly, perhaps—allowed the gas company to discharge their ammoniacal liquor into the tanks, thinking it would deodorize the sewage matter; but finding that the ammoniacal liquor was not absorbed, but escaped into the river and floated on the surface, the board, about three months ago, gave notice to the gas company to discontinue the discharge of the liquor into the tanks. The company immediately cut off the communication, and the ammoniacal liquor was now otherwise disposed of. He submitted that under the circumstances of the case the present system was the best that the board could adopt. Any large increase of rating would be a serious burden on the ratepayers, and injurious to the prosperity of Sandown. As for alternative sewage schemes, irrigation would involve a large outlay, and to discharge the sewage into the sea would be most objectionable and damaging to the town, which depended so much upon the bathing facilities which its splendid bay afforded.

Mr. *J. Newman* (the surveyor) described the general system of sewage in the town, and explained that the river Yar, into which the outfall flowed, took in a considerable amount of washings from meadows, farmyards, homesteads, &c., before it reached the outfall. The ammoniacal liquor from the gas-works, which was allowed to flow into the tanks, was cut off in July last. There was a ditch by the side of the gas-works, into which the whole of the ammoniacal liquor was formerly discharged, and during rains some of the tarry soakage which had accumulated there might be washed up and find its way into the river; but that would cease in time. He estimated the discharge of sewage at about 140,000 gallons a day. The annual cost of the tanks was about £20, and it was about met by the sale of the sludge. The rise of the tide on the shore was about 12 feet 6 inches. The surface of the land at the tanks was about 18 inches below the level of high water, and the bottom of the tanks was about 3 feet 2 inches below the surface of the land. Looking at the circumstances of the case, he thought the board were doing the best they could with the sewage. Land irrigation was undoubtedly the best scheme, but it would probably be opposed by the landowners, who would demand a high price for the land, and he questioned if the works could be carried out for less than £10,000 or £12,000. Another system would be the discharge of the sewage into the sea beyond Granite Fort, but that would be injurious to the bathing.

The Inspector said he would recommend the water company to sell their undertaking, and the local board to buy it. It was intolerable that a place like Sandown, relying upon its good name, should be dependent for the supply of such a prime necessity as water upon a private company, whose sole interest was to make all the money they could out of the public. The board could afford to give even an extravagant price for the works.

Mr. *Wooldridge* said there had been some negotiations which fell through. If the board purchased the works, they would have to expend a large sum in going to another source for their supply.

The Inspector: You can afford to do this, and the company cannot.

Mr. *Mew* said he occupied nine or ten acres of land adjoining the river, and had never found any nuisance arise from the outfall. He had cattle grazing on the marsh, and they had drunk from the stream without injury, and had never been annoyed by any discharge from the gas-works.

Dr. *Neal*, Medical Officer of Health, and Dr. *Thurston* having given evidence relative to the health of the district, a visit was paid by the inspector to the outfall and the tanks. On the inquiry being resumed—

Mr. Fardell, who appeared for the lady of the manor, who is also the owner of a large property in the town of Sandown and the marsh land adjoining, was heard in opposition to the granting of the certificate. He maintained that the duty of the local board was to provide a better system of sewerage than that which at present existed, and not to continue the pollution of the stream. Such a scheme was perfectly feasible, and notwithstanding the high rates in Sandown, to which reference had been made, ought to be carried out.

Mr. Estcourt, on behalf of the Commissioners of Sewers and others, also opposed. He informed the Court that the marsh lands under the jurisdiction of the Commissioners extended over 1036 acres, of which 336 acres were below the outfall of the Sandown sewer. The property within the Commissioners jurisdiction was of the rateable value of £2321 18s. 7d. per annum, and for many years past they had levied nothing less than a rate of 3s. in the pound. They were now spending a large sum of money—upwards of £3000—to protect the level from the incursions of the sea, and it was their duty to see that this valuable pasture land was not injured by sewage or in any other way. The river Yar was considerably affected by the discharge of sewage into it. There was a great growth of weeds in consequence, increasing the expense of keeping the river clear, and the sewage sediment which was deposited tended to silt up the river. The bottom of the river, from one end to the other below the outfall, was a mass of mud foul with sewage. Cattle feeding on the marsh lands were prevented from using the river water for drinking purposes, owing to its polluted condition, and it would also be shown that people living about three-quarters of a mile down the river were seriously annoyed and inconvenienced by the nuisance from this sewage discharge into the Yar.

Evidence was then given as to the existence of nuisance from the discharge of the sewage into the river, and as to formal complaints having been made to the Rural Sanitary Authority on the subject. The borough engineer of Ryde also gave evidence as to the probable cost of taking the sewage of the town out to sea, which he estimated at about £2000, which would involve the levying of a 2d. rate upon the inhabitants. The cost of an irrigation scheme he estimated at £3000, the interest on which sum, with £130 as the annual cost of pumping, would involve a 5d. rate.

The inquiry then closed.

OXFORD CORPORATION WATER-WORKS.

On Wednesday last the new reservoir on Headington Hill, which has been constructed from the designs of Mr. T. Hawksley, was formally opened. This reservoir, which is 150 feet above the source of supply, and will contain a million and a half gallons of water, is intended for the constant service of the city. The cost of the work was about £9000.

The Mayor (Alderman Eagleston) presided at the inauguration festivities, and, after the usual formal and complimentary toasts had been given, he proposed the health of the engineer (Mr. Hawksley), without whose ability and energy, he remarked, the works would never have been accomplished. It was needless, he said, to speak about Mr. Hawksley's reputation; it was world-wide, and the undertaking, whose completion was now celebrated, would be a lasting honour to that gentleman.

The toast having been cordially responded to,

Mr. Hawksley returned thanks, and, after alluding to the length of time during which the improvement of the water-works had been under consideration, said he considered that after all the delay had not been without its advantages. He believed they were now on the eve of a great success, and it depended entirely upon themselves whether they would or would not have a brilliant morning to succeed the evening. They had gone on very well, he must say; they had built a reservoir, but it was only a very small portion of the works, and was only for the regulation of the other part. It was with respect to the other part he wished to offer a word of advice, which should receive a good deal of attention, much more indeed than during the past quarter of a century had been devoted to it. Water was now a thing of very great value, but the people of Oxford were the most wasteful people upon the whole earth. He had been concerned in water-works in many other towns. One other was a town almost on all fours with this city of theirs; it was on all fours as regards population, pursuits, level, and almost everything else connected with water-works—the town of Cambridge. There the water was cared for. Every one had what he wanted, but was not allowed to waste it. The consequence was that everybody was well supplied, and everybody had 18 gallons of pure water per diem. But what was the rate of consumption in Oxford? About 80 gallons per head. There could not be a worse waste, and it was one attended with considerable expense. The water in the Thames was cheap enough, but by the time it got into their houses it was costly, and water so costly was wasted at the rate of at least 60 gallons per head per diem. They had to pay a very considerable sum of money for pumping water into the town, and now they would have to pump it out again. They would have to pump up 60 or 70 feet in order to get it on to their sewage farm. Was that a desirable thing? He had called Oxford a city of learning, but it was nothing else. If they would only take to heart what he was then telling them, they would save one-half of the expenditure in pumping water into the city and pumping it out again. Theirs was a curious position, and he hoped, for the sake of common sense, this subject would receive that attention which the experience of 50 years enabled him to give them. The work they had inaugurated that day could not have been carried out by him unless he had very able coadjutors. The first had been their very able chairman, Mr. J. Galpin. The Water-Works Committee had also given him their unlimited confidence, and he had had in Mr. Downing a great aid which he was proud on this occasion to acknowledge. He was proud also to be able to thank them for being invited to their very bountiful board, and as this was a city of learning, if he might express his views in a scientific form as to what their entertainments were, he certainly should say that, "As two o'clock is to a luncheon, so is seven o'clock to a dinner; and may I be there to see it."

The Town-Clerk, in responding to the toast of his health, said the mayor had told the company that in Oxford they had always lived under constitutional sovereigns, and he had a little bit of history to go back upon. About six years after William and Mary came to the throne it happened that Oxford could not find any plumbers of its own to do a little business for them. However, two plumbers afterwards came to Oxford, and said they were prepared to supply the city with water, and the corporation granted a lease to them. That was the first start of the city water-works. They put up their cistern at Grandpont, and, being plumbers, lined it well with lead, in the year 1694. At one time their speculation did not prove very prosperous. A Mr. Green, in the 18th century, came to the corporation and told them that he could not get on with it, and the corporation took it off his hands, and had continued it ever since under their own supervision. He thought when it was made efficient the corporation would find it a very profitable speculation. They could afford to wait, and they must all exercise a certain amount of energy. He could not help thinking that the time would come when they would find that, instead of the seductive influences of living in a university town, they should give way to the opinions of Mr. Hawksley, and do the great things they hoped to accomplish in a very short time, and he hoped that the time would come when they would reap the reward of the patience they had had to exercise.

The Mayor said that engineers, and chairmen, and boards were nothing without executants. They had sitting among them the gentleman who had carried out the work, the completion of which they were met to celebrate, and, as far as he had been able to understand, the work had been done in an able and workmanlike form. He had heard of no fault being found with it; on the contrary, praise had been given for the way in which it had been done; therefore they would be unmindful of his services if they did not drink "The health of Mr. Charles Dickinson."

Mr. Dickinson, in response, said he was very much obliged for the flattering terms in which his health had been proposed, and the cordial way in which it was received. He was very proud to have had the honour of carrying out their water and other works, and was happy to hear from the mayor that they were satisfactorily performed as far as they were concerned, but he was afraid their gain had been his loss. There were disadvantages that must be contended with, and he, being a young man in his profession, found that he had a very long score and very little remuneration. However, he hoped with this experience to be able to do better next time, and concluded by again thanking them for the kind way in which they had received his name.

SOCIAL SCIENCE CONGRESS, ABERDEEN.

Health Section.—Saturday, Sept. 22, 1877.

WASTE AND IMPURITIES OF WATER.

Two voluntary papers on the above subject were presented.

Dr. Stevenson Macadam, of Edinburgh, read the first paper, "On the Contamination of Water in Domestic Water-Cisterns." He said that the sediments or deposits in domestic water-cisterns were primarily formed from the clayey and earthy matters carried by the water into the cisterns, and where, on settling, the suspended matter was deposited as an earthy-looking sediment. If these deposits consisted solely of earthy matter, there might be no serious objection to their remaining in the cisterns, but the analyses of a number of the deposits had shown that the earthy was intermixed with lead compounds and organic *débris*. The examination of the sediments, he thought, had been too long neglected, and the notion held by some people that the deposits tended to clarify the water, and were, therefore, more beneficial than otherwise, must be reckoned both unsafe and dangerous. The analyses of a number of samples of these deposits or sediments, taken from cisterns in different cities, towns, and populous places in Scotland and England, gave, in soluble siliceous matter, from 52 to 63 per cent.; oxide of iron, with traces of alumina and phosphates, 16 to 24 per cent.; carbonate of lime, 3 to 14 per cent.; carbonate of hydrate of lead, 5 to 10 per cent. The lead compound was undoubtedly derived from the lining of the cistern, and its formation was easily accounted for. The carbonic acid dissolved in the water acted slowly upon the metallic lining, forming a white film on the surface, especially at the point where the water and air lines met. In cisterns where covers were used, and especially where the cover was lined with lead, the formation of this lead compound was much expedited by the water vapours—practically, distilled water—rising from the water in the cistern and condensing on the lid or upper part of the sides, where it readily formed carbonate and hydrate of lead. The latter compound becoming detached from time to time on drying up, fell as a powder into the water, and mingled with the earthy sediment in the bottom of the cistern. This action was much increased by the falling of lime into the cistern, and the introduction of organic matter, such as street or house dust, insects, and animals, mice, &c. The rapid entrance of water at any time into the cistern tended to disturb and float on this lead deposit in finely divided particles. Cases of lead poisoning which had occurred could only be accounted for by the water becoming contaminated with lead in this manner. The noxious influence of the cistern deposits was increased by the decay and putrescence of the organic matter, leading to the impregnation of the water with dissolved and suspended organic *débris*. Analyses proved that water retained over cistern deposits suffered severely in quality, there being a decided increase in the proportion of organic matter in solution, and in the saline and albuminoid ammonia, and a decrease in the amount of oxygen gas dissolved in the water. The results demonstrated that the water supply of towns or populous places and mansion houses (which might be everything that could be desired at the fountain-head, and even at the supply-pipe) as delivered to the householders, was liable to very serious contamination when retained in house cisterns containing deposits or sediments which were composed in part of finely divided lead compound, and otherwise rendered unwholesome from being retained in dirty cisterns. The remedy for the evil lay, he believed, in the periodic cleansing of the house cisterns, which should be regularly done every month or two. This, he said, should be carried out with a very soft brush, and every care must be taken that the natural skin of the lead be not disturbed. A wire or perforated zinc cover might be placed over the cistern to keep out mice, pieces of plaster, &c., but a tight cover, which would hinder the aëration of the water, should not be used.

Mr. William Boulton, surveyor to the City of Aberdeen, read the second paper, the subject being "The Waste of Water in Towns," the author almost exclusively directing his remarks to the water supply of Aberdeen, which, he believed, presented a better example of the extent to which the waste of water was carried on than any other town. He described the construction of the new water-works in 1866 under an Act of Parliament, allowing the corporation to take from the river Dee, at Cairnton, a maximum daily quantity of 6 million gallons. The reservoir and filter-beds into which the water was conducted, and which were capable of containing 13 millions of gallons, were then described. From the filter-beds at Cairnton the water was conveyed by gravitation in a brick aqueduct 12¼ miles in length to the low service reservoir, situated two miles from the town, and 168 feet above the level of the Ordnance datum, The capacity of this reservoir was 6¼ million gallons, and it supplied 98 per cent. of the inhabitants. The higher districts were supplied by a hydraulic pump and a reservoir capable of containing 500,000 gallons. The hydraulic pump was worked by two engines driven by means of water, the engines lifting one gallon by an expenditure of two and a third gallons, showing that there might be a considerable saving by employing steam instead of water power. These engines wasted 350,000 gallons daily, or 127,750,000 per annum. Estimating this quantity at the prime cost of the supply by gravitation, and adding the sum to the annual expense of maintaining the engines, it was found that the high service supply cost the town as much as the low service. The works, which were of a very superior description, had cost £166,000 up to the present day, and the annual working expenses amounted to £12,000. He then proceeded to give statistics of the increased consumption during the last ten years, in which it had risen to an extent out of all proportion to the increase of the population. Previous to the construction of the present works, the supply of water for domestic purposes was only 16 gallons per head per day, the supply then, however, not being adequate for the requirements of the town, but it had been nearly doubled since. The following table showed the increase since the construction of the works:—

Year.	Population.	Total Consumption Daily.	Total Water Used Daily for Domestic Purposes.	Water Used for all Purposes per Head Daily.	Rate of Water Used for Non-Domestic Purposes per Head Daily.	Water Used for Domestic Purposes per Head Daily.
1867	72,000	2,022,555	200,000	28·1	2·3	25·3
1871	80,000	3,131,514	350,000	39·1	4·4	34·7
1877	90,000	4,069,060	500,000	45·2	5·5	39·7

It would be seen from this that, since the introduction of the supply, the consumption per head per day for domestic purposes had increased to nearly double what it was formerly, and that the total consumption daily, including that used in working the engines, &c., amounted to the enormous quantity of four and a half million gallons. In dealing with the causes of this increase of consumption, he considered that it was due in a great measure to the introduction of water into the houses of the poorer classes, and the extensive fitting up of water-closets, baths, &c., which had been going on progressively for ten years. A great number of new houses of a superior description had been built for the upper classes, and these were provided with greater conveniences than ordinary houses, and, consequently, required larger supplies of water. If the consumption increased at the same ratio as it had been doing for the past half-dozen years, he calculated that they should within twelve years from this date reach the limit of the supply allowed by the Act of Parliament. While a considerable amount of this increase was attributable to improved sanitary arrangements, there was no doubt that the greater part of it was spent in excessive and unnecessary waste. He did not object to a liberal use of water for culinary and sanitary purposes, but he most emphatically protested against the scandalous waste which was caused by many people wilfully allowing taps and water-closets to run during the night, and, in fact, during all hours. This practice was very prevalent in almost every part of the town, and, as the taps at the backs of houses and in courts supplied many families, it was impossible almost to detect the guilty parties. He believed that this excessive waste of water resulted from the notion which the citizens seemed to have in their heads that the supply was inexhaustible, and from the belief that it improved the sanitary condition of the drains, which was a great mistake, as the water was allowed to soak the ground about the houses and produce dampness. He believed also that a great amount of waste was caused by defective taps and cisterns, &c., and it was often difficult to find out these deficiencies and have them remedied. He remarked that the greatest consumption of water was at midday, and the smallest between the hours of one and five o'clock in the morning, the first being 2·3 gallons, and the latter 1·3 gallons per head per hour. Most of the washing was done between three and six o'clock in the morning, and this, as well as the supplies for the manufactories which were carried on during the night, would account for a portion of the water consumed between one and five o'clock, but there was no doubt that a great deal of waste occurred during that period. He did not think that this waste could be materially checked or prevented without dividing the town into districts, and providing each district with a meter, which would show where the waste was actually taking place. They would either have to do this or they would soon be compelled to proceed with the construction of additional works, and he thought that a fuller and much more effective supply could be procured by conserving the present supply than by adding new works. If the public could only be brought to see the real circumstances of the case, he had no doubt that they would endeavour to avoid allowing so much waste, either through wilfulness or carelessness. They did not seem to consider the fact that the works were constructed at their own cost, and were literally their own property as a community, and ought to be cared for by them as such. This waste of water and the neglect of sanitary precautions undoubtedly led to increased taxation, but the citizens did not appear to consider these things. He was not aware whether any town had adopted a plan for the purpose of instructing the inhabitants in the use of sanitary appliances, but he was sure that, if properly gone about, it would be of great service and value. Why should not the School Board take up the question? With all the education, there was a great want of training in these matters, which might be fairly classed among domestic concerns. There was also, unfortunately, a sort of antagonism existing between a large mass of the community and the authorities on such matters. A feeling existed in the minds of many that they were harshly treated when the conservators of the public interests put in force the law, which had been framed with the consent of all parties, for their individual welfare as well as for that of the general community. He was of opinion that the corporations of the various towns, instead of employing inspectors, who were looked upon more as inquisitors or spies than benefactors, should employ men with something in them akin to the missionary spirit, to instruct people in the use of sanitary appliances, pointing out to them the saving that could be effected in taxation by aiding the authorities in checking the waste of water, and abstaining from acts calculated to injure or interfere with the working of sanitary appliances. Kindly explanations might be given, and thus a desire for co-operation and a feeling of mutual respect and regard would be engendered between the people and the authorities, and the social and moral status of the inhabitants elevated. This, he took it, was the aim and object of all social science.

In the course of the discussion which followed,

Mr. Edwin Chadwick said that the excessive waste of water was a difficulty which almost every town had to contend with. At one time it was found that about three-fifths of the water pumped into London was allowed to run to waste, but a system of inspection had been instituted, which had considerably reduced the waste, the consumption in some districts having been brought down from 54 to 17 gallons per head per day. There was altogether a mean reduction of about 13 gallons, consequent upon the enforcement of regulations. One of the great evils of this waste was that the ground about the foundations of the houses was frequently supersaturated, and in one he knew that water-cress was actually found growing in a cellar. The prevention of waste of water in towns had almost invariably been followed by a visible reduction of death-rate—a circumstance which was very easily accounted for. He believed that from seven to ten gallons per head per day was a very fair and sufficient supply in any town. With reference to Dr. Macadam's paper, he remarked that he decidedly objected to the use of cisterns for the supply of water for domestic purposes in towns, and strongly recommended the taking of the water direct from the pipes.

Mr. Joseph Brown thought that cisterns could do no harm if they were carefully and systematically cleaned out, but builders so often placed cisterns in places where they could not be got at for the purpose of periodical cleaning, that great neglect prevailed in regard to this important matter. He was astonished to hear Dr. Macadam recommending water to be drawn from the bottom of the cistern, where all the sediment collected, and where the impurities he had specified naturally found their way. The pipe should be at least 6 inches from the bottom of the cistern.

Mr. Boulton remarked that there were three systems of supply in Aberdeen. In some houses the whole of the water supply came through a cistern; in others there were only cisterns for the water-closets, the supply for domestic purposes coming direct from the pipes; and the third class was those who obtained all their supply direct from the pipes, and had no cisterns at all. Wherever cisterns could be dispensed with, he strongly recommended that they should not be used.

Mr. Baldwin Latham said Dr. Macadam had remarked that engineers were generally in favour of cisterns, and that they seemed to think that a few inches of sediment in the bottom was rather beneficial than otherwise. He believed that the opinion of engineers was that the sediment

was much better in the cistern than in the stomachs of the consumers. He gave some particulars as to the waste of water in different towns in England, and described various methods which had been devised for preventing it.

Mr. JAMIESON said that to a great extent the whole question resolved itself into a matter of cistern or no cistern. In towns where—as in Aberdeen, according to Mr. Boulton's paper—there was a plentiful and continuous supply of water, he did not think there was any use for cisterns at all, in view of the difficulty of thoroughly cleansing them periodically, for, although a few careful people might attend to this matter, the mass could not be expected to do so. Referring to the remarks of the previous speaker, that the deposit of organic matter in cisterns was an advantage, because the suspended matter was precipitated to the bottom, thus rendering the water pure, he said that the gentleman was forgetting that the contamination complained of by Dr. Macadam was due more to the action going on in the cistern than to the impurities in the original supply. The impurities were, in fact, engendered in the cistern, and experience went to show that whenever the supply could be got direct from the pipe it was much better.

Dr. MACADAM said the reason he recommended the water to be taken from the bottom of the cistern was that it prevented the accumulation of sediment and organic matter, and he much rather preferred to drink the impurities in the water at once than to take them after they had accumulated in the cistern for months, and were in a state of active putrescence. As to the alleged waste of water in towns, he said that in Scotland people had different views as to the amount of water they needed from those of the inhabitants of the sister country. He did not think that people should be stinted in their use of water for domestic and sanitary purposes. If one housewife used a pailful of water, and another used two pailfuls, he was pretty sure they would find that the one who used the two pailfuls had the cleanest house. Considering the amount of water required for baths, washing and cleaning, &c., he did not think that the consumption in Aberdeen was over excessive, and thought it was a dangerous cry to get up, that the great quantity of water supplied was an evidence of waste. Real useless waste ought certainly to be deprecated; but he thought it was rather a good sign that the poorer classes were using more water than formerly.

MONDAY, SEPT. 24.

The President of the Health] Section (Mr. EDWIN CHADWICK, C.B.) delivered an address on the present position of sanitary science, with reference to its future practical advancement. He said the statement recently put forward by a gentleman who occupied the president's chair in the Health Section at the Liverpool meeting, that, notwithstanding all the expense incurred by local authorities for sanitary works, there had been little alteration in the death-rate during the last forty years, was in great part true. It was very difficult, owing to our defective death registration system, to obtain distinct and just conclusions as to the results of these works, and the operation of the principles of sanitation, and the result of their application was better seen on similar classes of persons under similar conditions, as in the army and navy, or in public institutions under professional observation and care. The effect of sanitation on infantile stages of life was best shown in connexion with the institutions which had been erected for the care of destitute orphan children, and on the adult stages of the population the prisons afforded an excellent example. In many of the former the death-rate had been, by the introduction of proper ventilation and other sanitary arrangements, reduced to 3 in 1000, or nearly one-fourth of the general death-rate of children of the school ages, including the children of the well-to-do classes of the population. By means of clean air, clean persons, pure water, and of regulated regimen, prisons which had formerly been the seats of the reputed "gaol fever" were made seats of health, and displayed the most conspicuous norma to be kept in view of the power of sanitation on adult life. Sir Robert Christison, the distinguished consulting physician of the prisons of Scotland, had declared that the General Prison of Scotland, at Perth, was apparently the most healthy place in the world, for out of a total of 750 prisoners he generally found, on his periodical visits, only one woman and one man in the sick ward, and sometimes not one! The results were obtained by very rudimentary means, applied especially in the juvenile stages by agencies for which high refinement could not be claimed. The sanitary improvements which had been effected in the army and navy, with their beneficial results, were then described. In the former service the death-rate had been reduced from a rate of 17·5 per 1000 in 1858 to 9·06 in 1875, showing a saving of nearly three battalions of men, but he considered that, with more effective arrangements, the saving might be immensely increased. According to the last report the death-rate in the navy was 6·9 per 1000, or little more than one-half the death-rate prevalent amongst the men of the same ages of the civil population; but, nevertheless, it appeared to him that the progress of sanitation in that service was still unsatisfactory. In the mercantile marine the death-rate was three times greater than in the Royal Navy, showing the inferior care of the seamen in most instances. Proceeding to give normas of sanitation, obtained by improved civic and private construction, he said that it was difficult to get satisfactory statistical results of the sanitary improvements which had been carried out by local authorities throughout the country, but there was no doubt that the works, often carried out in a very rudimentary and defective manner, had reduced the death-rates by one-fourth, and even by one-third. It could easily be proved from statistics that it was quite possible, by sanitary measures, to reduce death-rates, while it might also be stated that they could so arrange common conditions as to multiply the most fatal disorders. With still further improvement and advancement in sanitary arrangements, he said, with confidence, that they might ensure a death-rate of less than 15 or 16 in 1000, or under the rate prevalent in the present model dwellings, which as yet were not perfect in construction. On definite data he had estimated the money loss from insanitary conditions at about £15,000,000 per annum. The various systems of sewage irrigation were then detailed, and the speaker said that the ordinary system by water drainage, when properly arranged, and under favourable conditions, and without excessive preliminary expenses, would pay. So far as his observation went, the sewage of a population of 100 might be utilized on an acre of land. On the whole, he considered that the venous and arterial system for the sanitation of urban populations was safe for eventual general adoption, in respect to economy as well as to health. After reviewing the effects of sanitation on Colonial and Indian cities, Mr. Chadwick concluded as follows:—I beg now to submit a summary of the results obtained of the progress of the power of sanitation, deducible from the normal instances I have adduced, or of which, from want of space, I have been obliged to content myself with giving indications for examination—1. That we have gained the power of reducing the sickness and death-rates in most old cities by at least one-third; or, as a rule, of reducing the death-rates in old British urban districts to 16 or 17 in 1000. 2. That in new districts, on sites apart from old urban sites, we may, with a complete arterial system of water supply and surface-cleansing—including measures for the prevention of over-crowding—ensure reduction of death-rates to less than one-half, or to a mean rate of 10 in 1000, and the sickness in the like proportion. 3. That in well-provided and well-regulated institutions for children from 3 to 15 years of age, we may secure them an immunity from the common children's epidemics, and reduce the death-rates to a mean of about 3 in 1000, or to less than two-thirds of the death-rates prevalent amongst children of those ages in the general population. 4. That in prisons and places under effective sanitary control the death-rates (from disease) have been reduced amongst persons from the school ages and upwards to about 3 in 1000, or to one-third of the death-rates prevalent amongst the general population of the same ages. 5. That to the persons in such institutions an immunity may be given as against all ordinary epidemics, typhus, and the eruptive diseases, diarrhœa, and dysentery, which ravage the general population. 6. That amongst the general population a reduction by full one-half of the diseases of the respiratory organs may be effected by general public sanitation. 7. That complete habits of skin cleanliness, alone and apart from general structural arrangements, or alterations of habits in other respects, constitute a factor of about one-third of the power of sanitation. 8. That, by a proper selection and a due sanitation of sites in tropical climates, and the sanitary care of the population, the birth-rates may be made to exceed the death-rates, and a healthy succession, for colonization, for people of the British or of the white races. 9. That by the increased health and strength imparted by improved physical training under sanitary conditions, on the half-school-time principle, in the infantile and juvenile stages, the efficiency of three for productive occupation may be imparted to every two of the most depressed classes of the population. 10. That the death-rates from disease in the mercantile marine may, by the exercise of the like powers of sanitation that are exercised in the Royal Navy, be reduced by two-thirds, or to the general death-rate now prevalent in the Royal Navy—namely, of about 6 in 1000. 11. That—as indicated by existing normas—the greatly reduced death-rates in the army at home and abroad, admit of important further reductions, by a more complete application of tried and approved means of sanitation. That all this may be done admits of more abundant proof than in this address I have been able to adduce on the present occasion; that all this has been done under conditions that admit of more complete and efficient repetition. On the whole, it will be found to justify the recent most important declaration of the Prime Minister to a greater extent than he has had time or opportunity to be made aware of. I cannot do better than repeat here the terms in which the declaration was made, that, "The health of the people is, in my opinion, the first duty of a statesman." From what is known, I may venture to express a belief that this declaration is in perfect accordance with the deepest feelings and wishes of Her Majesty the Queen. I have confined myself to the exposition, of the established normas of sanitary power, which are available for an advanced legislation and administration to apply. In the support of that advanced legislation we have new agencies, for the formation and guidance of an advanced public opinion. In alliance with our association we have the British Medical Association, with an effective joint committee, specially directed to the consideration of the improvement of the local and central organization of the public health service. Beside these we have new and zealous voluntary associations established in the Metropolis, and in the course of formation in the provincial cities. We have, moreover, new journals ably and earnestly devoted to the advancement of the public health. The like Governmental organizations and voluntary associations are in course of formation and advancement in the United States, in France, Belgium, and Germany. It will be my consolation and reward if the normal examples I have adduced shall serve to give increased confidence and encouragement to our fellow-labourers, for the reduction of the greatest afflictions of our fellow-creatures.

THE VENTILATION OF DRAINS AND SEWERS.

Dr. STEVENSON MACADAM, Edinburgh, read a paper on this subject. He said the present system of the disposal of the sewage of houses and towns was open to question in a sanitary as well as an economic point of view, as it undoubtedly led to the poisoning of our streams, and the contamination of the air in the vicinity thereof. Indeed, there was abundant evidence to demonstrate that the water-carriage system, with its attendant foul deposits in badly laid drains, was productive of much illness and disease in households. At present, however, there was no other process suggested for the disposal of sewage, which was less liable to objections for town purposes. Taking matters as they were, certain preventive measures might be adopted to guard against the evils of this mode of the disposal of the sewage. These evils were mainly due to the production of sewage gases in the drains and sewers, and to the escape of these gases into the houses. The primary cause of all the mischief was the lodgment of sewage in the drains and sewers, especially at the bends and in the hollows and depressions formed by badly laid drains, or badly founded drains and sewers, and where the levels were either originally not attended to, or the subjacent earth had yielded below. Another source of the mischief was, where the drains were imperfectly pointed and luted, and sand and earth fell in, tending to choke up the drain more or less, and either forming an elongated sewer, or even forcing the sewage out of the pipes altogether, and saturating the neighbouring ground, which might be close to, or underneath the dwelling-houses. The main preventive measure ought to be to look well to the levels, and thorough and efficient jointing, which would ensure the rapid and complete fall of the sewage from the house to the main drain, and thence to the point of disposal, either on land or in the sea Part of this work should fall on the individual householder, or house proprietor, as far as the private or service drain was concerned; and the other part on the municipal authorities so far as the main sewers were concerned. There were many instances in which the evil might be traced to the putrefaction of foul deposits lying festering and decomposing in the main sewers. Fresh sewage was comparatively sweet and harmless, and were it to have free passage onwards it would keep fresh till it escaped from the towns. The chemical nature of the sewage gas was generally misunderstood. It was commonly said that hydrosulphuric acid (sulphuretted hydrogen) and carbonic acid were types of the noxious sewage gases. No doubt the gases named were destructive to life when in quantity, but he was inclined to the belief that the more noxious of the sewage gases were evolved at an earlier stage in the putrefaction of the organic matters; whilst the sulphuretted hydrogen and carbonic acid were produced at a later stage in the decomposition. In fact, he believed that the main danger lay in the earlier stages, when gases of a more organic and combustible nature were produced. In the majority of cases it might be said that generally no precautions were taken in the construction of house drains and their attachment to the main drains to prevent sewage gas from passing back into the houses. The water-closets had generally a direct connexion with the drains and sewers, and not only so, but the waste-pipes from the cisterns had in most instances a passage to the sewers, either indirectly through the pan or bend of the closet, or directly to the drains themselves. Taking the case of ordinary house service and connexion with drains as ordinarily practised, there was simply a bend put on the direct pipe laid to the main drain. The only security in such an arrangement lay in the water-luting in the bend lying there in sufficient quantity, and not being forced by the presence of gases in the main drain, or being emptied by the suction of the descending water. To remedy this evil it had been suggested that a ventilating-tube should be inserted in the service-drain. This simple

ventilation was a decided improvement, but taken by itself was not sufficient. Between the ventilating-pipe and the closet bend there should be placed in the service-drain a U-shaped tube, with an upright drain-pipe leading to the surface, and in the throat of which there was inserted a wire cage containing fragments of dry charcoal. These upright pipes might rise above the surface when in open ground, or might be covered with a perforated iron plate when in outside passages or pavements. A still further improvement, where an opens space or garden front was at command, was to open up the drain for a foot or so on the house side of the U-shaped tube. In all cases there should be a ventilating shaft or sink-pipe to the roof of the house. This ventilating shaft or pipe might be a continuation of the service-drain. For the public ventilation of the street drains and sewers, the furnaces of public works should be utilized when such were available, and open air shafts should be carried from the main drains to the surface of the streets at numerous points. If the main drains were in good order there need be no escape of noxious gases, but where deposits of foul matter were lying in the drains, charcoal cages might be used, though the true remedy would be the cleansing out and repair of the defectively constructed main drains. There should also be the periodic flushing of all main drains and sewers by the opening of sluices or valves connected with large cisterns placed at proper distances apart. A sudden rush or escape of a large volume of water down a sewer at a given time would float all the solid *débris* lying in the bed of the sewer, and thus remove the cause of the production of sewage gases. In regard to cisterns, the position of them was often objectionable, being placed over the water-closet, and the exhalations rising therefrom were absorbed by the water, which thus became tainted. Great mischief arose from the carrying of the waste-pipe directly or indirectly to the drains, and from the ventilation of the service-box in the cistern. Both the waste-pipe and the escape-pipe from the service-box should be carried to the open air.

ANIMAL LIFE IN FRESH-WATER RESERVOIRS.

Mr. W. Ivison Macadam, Edinburgh, read a paper on this subject. He said that for some time he had devoted attention to the forms of minute animal life to be found in water reservoirs and other naturally and artificially impounded waters, and the result of these observations showed that the more common varieties of life were found to be certain minute crustaceans of the families Daphniadæ and Cyclopidæ. In the first of these the *Daphniapulex* and in the second the *Cyclops quandricornis*, deserved special attention. Both these minute crustaceans were found in all good impounded waters. They were obtained in the water supply of cities and towns, and during summer especially were to be obtained in the water-cisterns, and occasionally even in the water on tables. They were very abundant in Lochs Lomond and Katrine; in the reservoirs in the Pentland Hills, from which the Edinburgh water supply was obtained; in Loch Ascog, which supplied the town of Rothesay with water, and many other similar sources. The Cyclops was more common in cisterns, as, being a native of the deeper parts of lochs, it was more easily drawn off in the pipes to the cities than the Daphnia, which was principally found near the shore. Filtration of the water, though it might, and did, remove many of the "water fleas," did not entirely do so, as he had found them without difficulty in the water as it issued from the filters. In one case at least fear had been expressed that the use of waters containing these fleas would be hurtful to human life, and with a view of testing these statements he had made a series of experiments. These proved that the "water fleas" were very delicate, being unable to bear extremes of heat or cold, and that an amount of alcohol equal to 4 per cent., or the slightest amount of gastric juice, was fatal. The temperature found to be fatal was 85°. These forms of life were only found in good waters, and he felt certain that the use of water containing them would not be hurtful to the human system, provided that they be present in the ordinary numbers. He did not say that they were necessary to good waters, for although he had carefully searched for them he had never been able to detect them in good well waters. Yet, were these well waters impounded in large open reservoirs, he saw no difficulty in the fleas making their appearance, and that without in the least impairing the water for domestic use.

GAS MEASUREMENT.

By T. O'Conor Sloane, A.M., E.M., Ph.D.
Chemist of the New York Gaslight Company.

[From the *American Gaslight Journal*.]

The Referees form of cubic foot measure, if supplied with a proper tank, is unquestionably the most convenient and accurate form of that piece of apparatus. I have frequently had occasion to use one, and have had a light derrick constructed for the purpose of raising and lowering the tank.

The derrick is made of wood, in five pieces—four legs and a top. The top is a block of hard wood, 6 by 4 inches in section, and about 18 inches long. In one of its faces are sunk four holes, one at each corner. They are square and tapering, smaller at their bottoms than elsewhere. The legs are about 1¼ inch square at their largest section, and taper at the bottom to three-quarters of an inch square. They are 8 feet long. The upper end is shaped so as to fit the mortices in the head block. The mortices should be about 3 inches deep, and so inclined, that when the legs are inserted their lower ends will be the corners of a square of about 4 feet across.

This forms the derrick, and is amply strong without any further bracing; all the necessary strength is derived from the mortices.

The head contains two grooved wheels set into it, whose plane corresponds to the vertical when all is in position. One is in the middle and the other towards one end—both lie in the axis of the block, and consequently in the same line. A ring bolt is fastened to the block, in the same line and at the other end, and projects from the lower side of the block. A piece of smooth rope, preferably sash cord, and one double-sheaved pulley, with slings for the tank, complete the essentials.

One end of the rope is fastened to the ring-bolt, hence it passes through one of the sheaves of the pulley, over the centre wheel in the block, through the other sheave of the pulley, over the end wheel in the block, and then down. To secure the end to, a cleat is provided, fastened to one of the legs of the derrick.

The tank is a large galvanized tank, similar to a water cooler. By this arrangement it can, when full of water, be easily raised and lowered by one man—if he be of an industrious temperament, by the experimenter himself.

By a hose of proper length the faucet of the tank is connected with the inlet-pipe at the bottom of the cubic foot bottle. This is kept connected as long as the measure is in use. The tank is raised, and the cocks opened to fill it—the tank is lowered to empty it. The water runs in or out of its own accord, and no handling of it is necessary.

The advantages of this arrangement over any other are various. The exterior of the holder is never wet, so there is no lowering of temperature due to evaporation. The water is not disturbed; it runs back quietly into the tank, so that no pumping is necessary. This is of importance, as anything of the sort would tend to change its temperature. It is easily managed, as one person can do everything, and is very easily transported. The legs of the derrick can be taken out of the tapering mortices, which are made tapering for this end, and then the whole machine carried to any place where it is proposed to use it.

The Referees form of cubic foot measure it is, of course, quite unnecessary to describe. In conjunction with the derrick described above, it is a most convenient apparatus for testing small meters, photometer or experimental, whose drums have a capacity of a cubic foot, or of an integral part thereof. I will return to this subject later.

It is well to test a cubic foot bottle before using it, not to trust entirely to the maker's certificate. This may be readily done by filling it with distilled water, weighing it before putting it in, and, as a check, weighing it when running it out. The trouble is to secure the use of a suitable balance. I used one of the large balances (Becker's make) in the Assay Office in Wall Street, in this city, for the verification of a cubic foot measure, which is now in the possession of the New York Gaslight Company.

I took the measure with some ten gallons of fresh distilled water—it should be recently distilled, as it otherwise may have absorbed some oxygen or carbon dioxide from the air, and so have altered its specific gravity—to the Assay Office, and set the measure up near the balance I was to employ. To facilitate the introduction of the water, the upper glass tube should be removed. Besides the water a large flask of three gallons capacity, an accurate thermometer, a funnel, and some towels must be supplied. This is all the requisite apparatus. I shall now proceed with the account of my operations.

Water was first poured into the bottle until the mark on the lower glass tube was reached. The large flask was filled with distilled water and weighed. The water was poured into the holder, and the flask, with any residual water, again weighed. The difference gave the water which had been poured into the measure. Two or three of these flaskfulls nearly completed the filling. Then the upper glass tube was put in position, and more water weighed, poured in until the mark was reached, and the residue weighed. The sum of the differences gave the total weight of distilled water which the measure held. A string was then tied to the top of the thermometer, and it was lowered into the water in the measure, so as to ascertain its temperature. I then checked my result by running it out and re-weighing the water.

I obtained by this process the following figures:—

Cubic Foot Measure.	*Contents in Troy Ounces of Distilled Water.*
Temperature	60° Fahr.
Water introduced	909·615 fl. oz.
Water taken out	909·505 „
Average weight of water	909·560 „

The true weight of a cubic foot of water at this temperature is 908·884 troy ounces. The error, therefore, was equal to 909·560—908·884, or 0·676 troy ounces. The error is less than one-tenth of 1 per cent. I corrected it readily by changing the position of the marks on the glass tubes. This last correction I made afterwards with an ordinary balance, dividing the correction between the upper and lower tubes.

The testing of meters or graduated holders with the measure should be conducted in a room not liable to changes of temperature. The temperature of the room is noted, and the tank filled. This, by the addition of hot or cold water, is brought to the same degree of heat as that of the air of the room. If only a small meter is to be tested, it can then be filled from the water in the tank, as this may always be assumed to hold a little more than is necessary. If this be too great a drain upon it, or if several meters or a graduated holder are to be tested, a separate quantity of water may be brought to the proper temperature for them.

The object to be tested is levelled, filled, and adjusted, and water run into the measure until the lower mark is reached; its upper end is connected tightly by a hose to the inlet of the holder or meter. The tank is hoisted up, and water run in until the upper mark is reached. The rate must, in the case of a meter, be the same as that at which the meter will be run in practice. Thus 1 cubic foot of air will have passed from the holder, and will give the error of the object tested.

A Sugg photometer meter has a drum-capacity of one-twelfth of a cubic foot. Nothing is more accurate or convenient for testing them than a cubic foot measure, arranged and worked as I have described.

Station-meters are generally tested by the meter makers, and in a very empirical manner. To do it accurately the temperature and pressure of the gas must both be taken into account.

They are tested by a standard meter. Gas is passed through the standard and station meters, one immediately following the other. Either one may come first.

The standard should be a wet meter, and very carefully verified. It should be provided with pressure-gauge and water-level indicator. The upper end of the indicator should be connected by a pieee of tubing with the inlet-pipe of the meter. The usual connexion with the gas in the meter-case should be cut off. Thus arranged it will indicate the level of the water inside the drum. It should, on all meters, be thus connected, but it is not generally done.

We will suppose now that the accuracy of the standard meter is known. It is placed in position near the station-meter, and connected with the outlet-pipe. Its own outlet may lead into the air, or gas-mains. Gas is now passed through both in succession. Readings of pressure in both meters, and also of temperature, must be taken at short intervals; index readings should be taken every 25 to 100 cubic feet, according to the drum capacity of the station-meter. The passage of gas should be continued until twice the drum contents of the large meter shall have been passed, or, what is the same thing, until that drum should have made two revolutions. Then a comparison of meter readings, after corrections for temperatures, will give the error, if such there be, of the large meter.

The standard meter will generally run so fast that the water in the water-level gauge will keep up a continual oscillation. The best that can be done is to average it with the eye. Then water must be at hand so as to always keep the right amount in; if the rate varies, a little water may have to be added or removed.

I had occasion to test station-meters, which I wished to refer to the cubic foot measure. I adjusted the water-line of a Sugg's experimental meter with the measure, adding or removing water until it registered nearly correctly. This meter had a drum capacity of one-twelfth of a cubic foot.

The standard meter was placed in its final position near the station-meter. The Sugg meter was taken to the same place, and the standard tested with it, until a correct water-line was determined. A good practice is to try the small meter immediately before and after this verification of the standard. I give below some of the readings I obtained in testing the standard.

Sugg's meter registers 99·9 per cent.

Sugg's Reading.	Temperature.	Time.	Standard Reading.	Temperature.
961·85	75°	11.08 a.m.	1051	77°
970·90	77	12.06 a.m.	1060	77¼
1026·00	78	4.02 p.m.	1115	77

Total amount by Sugg's meter . . . . . 64·15
Total amount by standard meter . . . . 64·00
Registry of Sugg's, 1-1000th . . . . . 64·21

This meter may be considered correct. The average of all the temperatures taken, though nearly the same for each meter, favours a correction which would bring the standard still nearer correctness.

The capacity of the drum of the station-meter under trial was 1000 cubic feet. It is a rule that should always be followed, that a meter is always to be tested by an exact number of revolutions. No partial revolutions are admissible.

Below is a table giving several of the readings obtained in testing the station-meter. In this case the gas first passed through the station-meter, then through the standard, and then into the air.

Standard Readings.	Meter Temperature.	Time.	Station Readings.	Meter Temperature.
00	65°	10.10 a.m.	00	65°
104	—	10.23 a.m.	100	—
1107	64½	11.32 a.m.	1100	66
3111½	64	1.26 p.m.	3100	66½
	Pressure, 2 inches of water.			Pressure, 6 inches.

Average of Readings.

Standard meter	1107—104	Average Temp.	65·1°	1003
Station-meter	1100—100	,, ,,	66·4	1000
Standard meter	3112—104	,, ,,	64·8	3008
Station-meter	3100—100	,, ,,	66·4	3000

Corrected for the difference in temperature and pressure, the 1000-feet readings become—

Standard meter	1,066
Station-meter	1,104

Corrected as above, the 3000-feet readings become—

Standard meter	3,021
Station-meter	3,031

Taking the standard meter readings as 100, the station-meter registration reduces by rule of three to—

For the 1000-feet test	100·38
For the 3000-feet test	100·33

That is to say, the meter under trial registers 35-100ths of 1 per cent. too much gas, or too fast.

Another test applied to the same meter gave the following results:—

Per centage of station-meter, 1000-feet test	99·5
,, ,, 3000-feet test	99·7

This indicates an error of six-tenths of 1 per cent. the other way, or too slow a registry.

The average of the two tests is, of course, $\frac{100{\cdot}35 + 99{\cdot}6}{2} = 99{\cdot}97$; thus indicating that the meter was almost exactly correct.

So much for the correctness of the registration. A slow test was next made to try the soundness of the drum. Here, as the meters were run very slowly, no account was taken of the temperatures; it was assumed to be the same in both, and was nearly the same owing to their proximity. The pressure was, of course, practically identical.

Time occupied in passage of gas	22 hrs. 42 min.
Gas registered by standard meters	1573
Gas registered by station-meters	1560

Reducing as before to per centage reading, we find the registry of the station-meter was 99·1 per cent. This proved conclusively that the drum was sound, and tended to corroborate the second of the fast tests.

As no error was found exceeding 1 per cent., and as the average of the first two trials, the only ones to be considered at all conclusive on the subject of accuracy of registration, was so very near correctness, the meter was reported correct. The third or slow test was only made to prove the soundness of the drum, and was not regarded as affecting the question of accuracy.

The drum capacity of the station-meter was 1000 cubic feet.

The correction for difference in pressure may be made quite near enough to the truth on the assumption that 4 inches water pressure compresses the gas 1 per cent. of its volume.

The correction for difference in temperature may be made by the following table:—

The Table shows the Per Centage of Increase of the Volume of Gas above its Volume at the Temperature of 31·4° Fahr.
(*Astronomer Royal, Parliamentary Paper No.* 339, *Session* 1861.)

Temperature in Fahrenheit's Scale.	Per Centage of Dilatation.	Temperature in Fahrenheit's Scale.	Per Centage of Dilatation.	Temperature in Fahrenheit's Scale.	Per Centage of Dilatation.
31·40	0	54·33	5½	74·30	11
33·54	½	56·24	6	75·94	11½
35·70	1	58·12	6½	77·23	12
37·84	1½	60·02	7	78·81	12½
39·91	2	62·00	7½	80·40	13
42·05	2½	63·77	8	81·94	13½
44·17	3	65·63	8½	83·44	14
46·22	3½	67·43	9	84·88	14½
48·25	4	69·18	9½	86·33	15
50·32	4½	70·90	10	87·93	15½
52·36	5	72·60	10½	89·20	16

PORT ELIZABETH (CAPE OF GOOD HOPE) GAS COMPANY.—The *Port Elizabeth Telegraph* reports the last meeting of this company. The directors, in their fifteenth annual statement, congratulate the shareholders on the continued progress and the increased returns of the company. They have during the past year paid off the bond held by the Port Elizabeth Fire and Marine Assurance Company. They have also placed in the market 200 reserved shares, the premium on which has been placed direct to the credit of reserve-fund, which is thus increased £100. A case, arising out of a claim for demurrage, which had been pending against the company since 1872, has been decided by the English Courts in their favour, with costs. The profit on the year's transactions amounted to £4018 8s. 5d., which the directors recommended should be appropriated as follows:—

Buildings	£150	0	0
Plant	1000	0	0
Meters	150	0	0
Reserve-fund (making it £4250)	600	0	0
Directors	250	0	0
Auditors	42	0	0
Dividend to shareholders, 9 per cent.	1759	1	0
Balance to next year	67	7	5
	£4018	8	5

IRON AND COAL TRADES OF SHEFFIELD, SOUTH YORKSHIRE, AND NORTH DERBYSHIRE.

(FROM OUR OWN CORRESPONDENT.)

In some branches of business there has been rather more work doing last week, and in several quarters it is thought that there is now some prospect of a revival of trade. Our advices from the United States appear to indicate the certainty of a brisk fall trade, owing to the plenitude of the harvest in the Southern States, which have been very indifferent buyers of our manufactures since the war. Already, in some branches of business, I hear of a decided change for the better, and it only remains for the alteration to spread to other departments to give us an earnest of a vastly ameliorated state of affairs during the winter or early in 1878.

The iron trade still remains about the worst engaged of all our industries, and, in the ordinary way, is on a very limited scale. There has been no improvement in the pig iron market during the past week, either in respect of prices or demand, and the state of the other markets of the country would appear to show that quotations are by no means likely to stiffen much at present. Of merchant irons the sales are most meagre, hoops being, perhaps, in the best demand. There is a good call for boiler and ship plates, both of iron and steel, and a steady inquiry for locomotive frame-plates, pistons, &c.

In the coal market there are many signs of a stronger state of things being about to arise. There is already a much larger sale of house coal for this and other towns, particularly for London. Prices, as a necessary consequence, are going up to the extent of about 1s. per ton on the average, although some of the vendors are advancing to the extent of 1s. 10d. Slack and small coal generally are not in great request, but steam qualities are moving off in tolerably heavy lots on export and home account.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

A few inquiries for gas coal still come into the market, but there is very little doing in this branch of business, and prices nominally are without change. A general want of animation is still the prevailing feature of other branches of the coal trade, and there are sellers at extremely low prices. All classes of round coal are abundant in the market, and, if anything, are lower than they were a month back, sellers who have to push sales being compelled to take a trifle less money for good orders. Common classes of coal continue a complete drug, and are very irregular in price. Engine classes of fuel are more plentiful in the market, and are offered for less money. The average selling prices at the pit mouth for quantities may be given at 9s. to 10s. per ton for the better sorts of Arley, about 8s. for Pemberton four-feet, 5s. 6d. to 6s. 6d. and 7s. for common coal, according to quality, 4s. 6d. to 5s. 6d. for burgy, and 3s. 3d. to 3s. 6d. and 4s. per ton for slack.

Orders for shipment are very scarce, and are only given out where extremely low prices are quoted.

There is still very little demand for any description of iron, and the unprecedentedly long period of depression in this branch of trade shows no sign of any change for the better. Local makers of pig, at the reduced prices, which can scarcely cover the cost of production, are only securing orders sufficient to keep about three or four furnaces going, whilst north country iron is now a drug in this market. Finished iron is without material change, all the works throughout the district being still extremely short of orders, and the prices ruling in the market very low, Lancashire bars delivered into the Manchester district being quoted at from £6 10s. to £6 12s. 6d. per ton.

THE COAL AND GENERAL TRADE OF THE NORTH.

(FROM OUR OWN CORRESPONDENT.)

The coal trade of the Tyne was a good deal hampered last week, through a scarcity of ready sailing vessels. Fleets of small ships have accumulated in Yarmouth Roads and Bridlington Bay. They are kept back by contrary winds. Several small ships are on their passage from the east coast, freighted to load gas coals on the Tyne. In consequence of the scarcity of tonnage, from 3d. to 6d. per ton advance was paid in freight to handy little sailing vessels. There were not many orders to hand, however, and the business generally was quiet. The best qualities of gas coals are quoted at recent prices. But actually the value of these coals is not what they are quoted, but what they will fetch. There is no doubt, therefore, that a large amount of business is transacted in a fair quality of gas coals at from 7s. to 8s. per ton. As I have stated previously, nearly all the new business for gas coals is done in the open market. But gas companies and merchants are inclined to enter upon contracts for delivery over next year, at a slight advance upon the prices at which gas coals are now sold in the market. Shipping turns are immediate; that is, as soon as vessels arrive they are loaded. Steam coals show a considerable tendency to fall off. Second-class pits in this trade work very badly. There is an ordinary shipment of house coals.

With regard to the general freight market last week, the tendency has been a little upwards. The Turks seem inclined to lay in a stock of steam coals for the winter, and freights thence have risen from £2 to £9 per keel. Gas coals being needed in some of the Italian cities, shipping rates have gone up about £1 per keel, but this rise in freights will only be temporary. Within a fortnight they will probably be back to their old position. The iron trade of the Tyne looks better. There is an improved inquiry for manufactured iron. Several new steamers have been ordered, and the winter prospects are not bad. The chemical trade is very dull, but as business looks a little better in America, it is very likely there will be an improvement in this trade shortly. There are fair average shipments of fire-clay goods.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

Opinion seems to be spreading among the municipal bodies throughout Scotland in favour of the Burghs Gas Supply Act. The latest evidence is the fact that the Act has just been adopted unanimously by the Town Council of Peterhead.

At a recent meeting of the Montrose Police Commissioners, the offer of the Montrose Gaslight Company to supply the public lamps with gas for the ensuing year at the following rates was accepted:—One-hole jets, 4-inch flames, 5s. 3d. per 1000 hours; flat flames, patent jets, 12s. 6d. per 1000 hours—being a slight reduction from last year's rates.

The Town Council of Whitehorn, an ancient Royal Burgh in Wigtonshire, at their ordinary meeting held last Wednesday night, resolved to light the streets of the town with oil, on account of the unusually high price charged for gas during recent years by the gas company. Provost M'Culloch moved that the streets be lighted with gas as formerly, but the motion was not seconded.

A propos of the visit paid to Helensburgh, during the past week, by the West of Scotland Association of Gas Managers, it may be mentioned that the gas company of that favourite Clyde watering-place were constituted about 37 years ago. The first gasholder erected by the company had not a much greater capacity than a goodly-sized dining-room, and the greatest difficulty which the company had to contend with at first was a marked

degree of unwillingness on the part of the people of the town (or rather village) to let the gas into their houses, lest the act might result in the inhabitants being blown out into the Firth of Clyde by an explosion. For several years the shareholders had no dividends, but in course of time a profit was made, and eventually the undertaking has become one of the best paying private gas concerns in the West of Scotland, the last dividend paid to the shareholders being 12½ per cent. per annum. In consequence of the great extension of the town in recent years, the company have been compelled to make very important additions to, and alterations upon, their works. Those additions and alterations are still in progress, but when they are finished the town will be in a position to boast of having one of the nicest gas-works in all Scotland—thanks, of course, to the energy and professional skill of Mr. Smith, the manager, and to the support which he receives from a body of enterprising directors, some of whom have been connected with the undertaking almost from the very first. The opposition which threatened a year or two ago to assume some definite shape, has now entirely sunk out of sight.

The illuminating power of the Glasgow gas for the week ending Sept. 22 is again reported upon by Dr. Wallace as very good. In no case was the minimum under 25·20 candles, while the average ranged from 25·74 candles up to 27·68 candles, and the maximum from 26·10 candles up to 28·63 candles.

As might be expected, the recent decision of the Greenock Police Board to devote £4000 of last year's profits on the gas supply undertaking to assist in reducing the police assessment, is not meeting with universal approval amongst the ratepayers; indeed, there are persons, both inside and outside the Police Board, who think that, when there is any profit on that undertaking, it should be employed in reducing the price of the gas, and not have it higher than in a number of other towns which are not any more conveniently situated than Greenock.

Mr. J. F. Bateman, C.E., F.R.S., arrived at Perth on Wednesday last, and, along with Mr. John Young, C.E., made an inspection of the ground which is to be occupied by the new water-works, about to be constructed in accordance with the provisions of the Act of Parliament passed last session. This inspection is preliminary to the preparation of the plans.

The rainfall at Glencorse reservoir (Edinburgh Water-Works) from the 1st of January to the 25th of September of the present year amounted to 43·60 inches, as compared with 30·20 inches during the same period in 1876, and 23·30 inches in 1875. The foregoing statement sufficiently indicates the extraordinary wetness of a large part of the present year. From the fortnightly statement, showing the quantity of water in the reservoirs and delivery in Edinburgh, it appears that on the 25th of September there were 685,245,152 gallons in store in the five reservoirs, as compared with 697,134,152 gallons on the 11th of September; whereas at the corresponding date of last year there were 321,562,475 gallons, or more than a half less. At present the delivery in Edinburgh, in gallons per minute, is 6990·06, equal to 35·09 gallons per head per day, to a population of 286,800.

On Thursday forenoon as high as 54s. 4d. cash per ton, and 54s. 6d. one month, were obtained in the Glasgow pig iron market, but in the afternoon the only transactions reported were done at 1½d. per ton less. There was a steady market on Friday forenoon, and 1000 tons changed hands at 54s. 2½d. cash, the market closing with buyers at 54s. 2d. cash, and sellers asking 54s. 3d. No change took place in the afternoon.

The coal market has been very dull during the past week. Shipping orders are scarce, and the look ahead is very dull indeed. Local trade does not improve at all, and the tendency of shipping coal is cheaper. House descriptions maintain the prices recently paid.

WEST OF SCOTLAND ASSOCIATION OF GAS MANAGERS.

Tenth Half-Yearly Meeting.

Our Glasgow Correspondent, knowing that the complete official report of the proceedings cannot appear in our columns for several weeks, and believing that many of our readers, especially in Scotland, will be anxious to know what took place at the meeting referred to above, sends us the following short summary:—

The tenth half-yearly meeting of the West of Scotland Association of Gas Managers was held at Helensburgh last Thursday—the President, Mr. James M'Gilchrist, Corporation Gas-Works, Dumbarton, in the chair. There was a large attendance of members, and there were also present—Mr. William Sugg, Assoc. Inst. C.E., London; Dr. Wallace, gas examiner, Glasgow; Mr. Henry Aitken, Falkirk; Mr. Samuel Stewart, Corporation Gas-Works, Greenock; several directors of the Helensburgh Gas Company, and other gentlemen. In the minutes (read by the new secretary, Mr. Robert S. Carlow, Port Glasgow) there was a full account of what had been done by the committee of the Association during the past half year. In moving the adoption of the minutes, the President referred to the presence of Mr. Sugg at the meeting, that gentleman having, by request, attended for the purpose of reading a paper descriptive of his Illuminating Power Meter; and, on the motion of the President, Mr. Sugg was unanimously, and with much enthusiasm, elected an honorary member of the Association.

Mr. Sugg, in appropriate terms, acknowledged the honour conferred upon him, and promised to attend the future meetings of the Association as often as might be in his power.

There were subsequently elected three extraordinary members, and eight new ordinary members. Including the new members elected at this meeting, there are now upon the roll the names of 185 gentlemen in the various grades of membership.

Mr. M'Gilchrist delivered a very interesting address in his capacity of President. It was short, but was at the same time both comprehensive and suitable to the occasion. Amongst other subjects, it dealt with the annual reports on Scotch gas statistics issued by the Association, and the increasing interest felt in them in many parts of the world. It also referred to the Journal of Gas Lighting, and its great value to all concerned in the manufacture and supply of gas. He mentioned that a prize of £10 had been offered for the best paper "On the most economical Modes of Manufacturing Gas from Coal or Shales to produce from 25 to 30 candle gas," and he indicated a variety of ways in which experiments might be directed so as to secure the economy hinted at. Referring to other associations of gas managers, he spoke of having been a visitor at the last meeting of the Waverley Association of Gas Managers, and was glad to see present a deputation from the parent organization, consisting of Mr. Clazy, of Kelso, and Mr. Robson, of Selkirk. Amongst recent improvements in connexion with gas manufacture, he noticed at some length the process at present being worked out by Mr. G. R. Hislop, Paisley, for the revivification of gas lime, and regretted that, on account of the process being still incomplete, that gentleman had been compelled to decline submitting a paper upon it to the Association. The President regarded the process in question as being fraught with most important results. He subsequently referred to the Burghs (Scotland) Gas Supply Act, and urged that, in cases where corporations proposed to take over the gas supply, managers of gas-works should maintain a perfectly neutral attitude. His own opinion was that gas managers might be quite as comfortable under corporations as under companies. The subject of fittings was also discussed by the President. He said that almost all the complaints they heard regarding bad gas were due to bad fittings. They were doing great injustice to themselves, as well as to the consumers, in allowing gas-fitters to fit up houses with pipes at random. Gas companies and corporations should prepare printed forms, giving the sizes of pipes for the various distances to be supplied. Licences might be given to competent gas-fitters, who should bind themselves under a penalty to fit up pipes according to instructions; or a rule might be adopted, to the effect that no consumer should be supplied with gas who had not pipes fitted up as they should be. It was astonishing the ignorance displayed, even by educated gentlemen, on matters pertaining to coal gas. Not long ago, a learned sheriff, not by any means a jocular man, had gravely suggested to a gas manager the propriety of sending the good gas to good payers, and the bad gas to bad payers. After some further remarks, the President concluded amid much applause.

On the motion of Mr. Macleod, the President was cordially thanked for his excellent address, and on the part of the directors of the Helensburgh Gas Company, the members of the Association were heartily welcomed to the town.

The other business on the programme was then proceeded with, the first item being a short paper by Mr. Duncan Jeffrey, Kirkintilloch, entitled "A Twelvemonth's Experience with the Steam-Jet Exhauster." Mr. Jeffrey spoke very highly of that appliance, but considered that it was not placed in the proper situation. This paper gave rise to some valuable remarks from Mr. Young (Clippens Oil-Works), Mr. Mitchell (Coatbridge), Mr. Robson (Selkirk), and Mr. Sugg, the last-named gentleman mentioning the results of the experience gained with the exhauster both in London and on the Continent, and regarding it he said there were very conflicting opinions.

Mr. Sugg, at considerable length, then gave a description of his Illuminating Power Meter, and illustrated it with many interesting experiments, which showed that the gas then being supplied in Helensburgh had an illuminating power of 30 candles. Dr. Wallace took part in the discussion which followed, and explained his method of providing against the irregularities of the so-called standard candles used in gas-testing. He also spoke of the scientific labours of Mr. Crookes and Mr. Vernon Harcourt in photometry, and he thought that sperm oil might with advantage be used in gas-testing instead of candles. Mr. Young made some remarks on the results of the elaborate experiments made by his late brother-in-law, Mr. Cusiter, in regard to the durability test and absorption by bromine in their relation to illuminating power, and he thought that the flame used with Mr. Sugg's meter was liable to be affected by the varying quantities of carbonic oxide in coal gas. Mr. Samuel Stewart expressed himself as being much pleased with Mr. Sugg's invention, and the members generally seemed to regard it as of great value. A very hearty vote of thanks was awarded to Mr. Sugg, after which there was a short adjournment for the purpose of visiting the Helensburgh Gas-Works, and inspecting the important alterations and extensions in progress. The members were agreeably surprised to find that the directors had made provision for giving them a very hospitable entertainment. On returning to the place of meeting,

Mr. Samuel Stewart read a very comprehensive paper "On the Construction of Works," in which were embodied many valuable suggestions, the results of that gentleman's large and varied experience, both at home and abroad. It led to an interesting discussion, in the course of which remarks were made by Messrs. Monk, Niven (Dunoon), Young, Clazy, Robson, and Macleod.

Mr. Henry Aitken followed with a short paper, by way of introducing further discussion on the "Aitken-Young Patent Process of Gas-Making."

Shortly afterwards the meeting terminated, and the members subsequently partook of dinner in the Imperial Hotel—Mr. M'Gilchrist in the chair, and Mr. Stewart discharging the duties of croupier. Some interesting speeches were delivered on the occasion, especially by two members of the Helensburgh Gas Company's directorate.

On the following day a number of the members and their lady friends had a delightful excursion through some of the most beautiful and romantic scenery of the West of Scotland, proceeding by waggonettes from Helensburgh to Luss, along Loch Lomond, "the Queen of Scottish Lakes," to Tarbet, thence to Arrochar, and by the side of Loch Long to Gareloch Head, and along the Gareloch to Helensburgh. The whole of the arrangements were carried out by Messrs. M'Gilchrist and Carlow, and both the excursion and business meeting were of such an agreeable character that the members will long cherish a fond recollection of their visit to Helensburgh on the occasion of the tenth meeting of the West of Scotland Association of Gas Managers.

Quality of the Newcastle-on-Tyne Gas.—Mr. John Pattinson reports as the results of his examinations, for the month of September, of the quality of the gas supplied to the borough by the Newcastle-upon-Tyne and Gateshead Gas Company:—

Date.	Illuminating Power in Sperm Candles.	Grains of Sulphur in 100 Cubic Feet of Gas.	Sulphuretted Hydrogen.
Sept. 4	15·1	5·89	Nil.
„ 7	15·0	6·67	„
„ 11	15·5	7·74	„
„ 14	14·0	7·57	„
„ 18	14·5	7·95	„
„ 21	16·2	7·43	„
„ 25	14·9	7·94	„
„ 28	15·3	8·81	„

A Sugg-Letheby standard Argand burner is used in testing. According to Act of Parliament, the gas should not be of less than 14 standard candles illuminating power, nor contain more than 17 grains of sulphur per 100 cubic feet of gas.

Sanitary Science.—Hygeiopolis is still the theme of the Social Science Congress. Mr. Chadwick professes himself ready to build, at the command of Vishnu the Preserver, a city where the death-rate shall not exceed 10 in 1000, or one-half of the general average of sickness and mortality in a great city, shall prevail. He postulates a good many data certainly. It is the old story of "Give me the leverage, and I will move the world." Mr. Chadwick wants no overcrowding, no bad gas in houses, no damp walls, no vermin, plenty of sunlight, houses cool in summer and warm in winter, with good water, and no deterioration of it *in transitu*. Then something might be done in the way of diminishing the death-rate. Not only so, but, adopting the phraseology of a recent popular article, life would be worth living, too. The difficulty is to secure all these desiderata. The Golden Age would come again if we could secure its conditions. We want to find out how we can get pure air, water, and sunlight in the middle of the big city. Then it would be Hygeiopolis at once. The worst of all these glowing pictures at Social Science Congresses is, that they put us in the position—not so much of Tantalus, as of the personage in Sir Thomas More's "Utopia," who was always having that pleasant Land of Nowhere described to him, where people never grew old, and everything was just as it ought to be. All was satisfactory save one circumstance—the person who described that Land of Promise *left* it a land of promise only; he never could fix the latitude and longitude.—*Salford Weekly News.*

INTRODUCTION OF GAS INTO BRISTOL.—The *Bristol Daily Post*, of Friday last, says: "With reference to an inquiry, in our yesterday's impression, as to the date at which gas was introduced into Bristol, we find that it was first used as a means of illuminating the streets towards the close of 1819. Prior to that period, Mr. Breillat, of whom we made mention yesterday, had made many private experiments with the combustible vapour, at his premises in Broadmead, and had excited great wonderment by producing from no then known agency a bright flame of fire in the middle of a glass globe in his window. The proposal to form a gas company was ridiculed at the time by almost everybody. A worthy alderman declared that nothing should induce him to believe that they 'could carry flames through pipes buried under the earth,' and the citizens generally were most incredulous. Dr. Edward Kentish, an eminent physician, who then resided at the top of Park Street, was one of the chief movers in the matter on what may be termed the gas side of the question, and we remember having seen an old caricature, in which he was depicted as treating with Lucifer for a supply of fire from the infernal regions. The doctor did not get off with the uncomplimentary picture only, for he was burlesqued in a song, in the refrain of which, we recollect, were comprised the lines:

'And then Doctor Gas,
That stupid dull ass.'

Gas, however, was a scientific truth, and its value was soon made apparent. In 1819 the Bristol Gaslight Company obtained their Act of Parliament, and late in the same year the first experimental street-lamps were put up and lighted in Castle Green. Those who doubted and scoffed were soon brought to confess and admire, and no great time was suffered to elapse before the old oil-lamps were made to give way to a brighter and more manageable illuminating power."

PUBLIC LIGHTING IN BRISTOL.—At the meeting of the Sanitary Committee of the Bristol Town Council, on Thursday last, the Sub-Committee on lighting reported that experiments with oil gas were still being carried out to their satisfaction. They had every disposition to meet the gas company fairly, but could not recommend the acceptance of the proposed contract for three years, because they considered the public were equitably entitled to the full reduction of 3d. per 1000 feet, which was made to private consumers since July, as it was proposed to introduce a new feature in the contract, by increasing or reducing the public charge *pro ratâ* with the private charge at any time in future. The secretary of the company now forwarded a letter stating that the directors did not feel themselves in a position to make any further alteration in the tender, but were willing that in future the committee should receive the same increase or decrease in charge as affected private consumers. Mr. Mathews, in moving the adoption of the report, said that the only difference between them now was 1s. 8d. per lamp. Mr. H. Naish, who seconded the motion, pointed out that in Bath, where the company were disadvantageously situated for materials, the reduction for public lamps had been 8½ per cent., as compared with 4½ per cent. in Bristol. Mr. Gardner hoped they would oppose the company on that point to the full extent, even if it came to starting another company, or making gas themselves. Mr. Inskip suggested that, before committing themselves to any course, they ought to go to the council and receive instructions. Although feeling the difficulty of dealing with a company possessing this monopoly, and in a position to dictate terms, he entertained great fears of making experiments at so short a notice. If they contemplated breaking with the company and introducing a new light, they had better take advantage of the three years contract, and submit to the aggregate loss of £900 in dispute in order to get full time for considering their plans. He moved that the committee should report the facts to the council, and recommend that at present they accept the company's terms. Mr. Gardner seconded the motion, on the ground that the contract would be taken with the full determination of thoroughly experimenting on the new light in a large number of lamps. After further discussion the report was adopted, and the sub-committee were requested to prepare a report to the council.

Register of New Patents.

1961.—LASCELLES, C. T. E., New Cross, London, "*Improvements in gas and other explosive motive-power engines.*" Patent dated May 10, 1876.

This invention consists in fitting to the crank, or to a supplementary shaft of the engine, a wheel containing a spring, which has one end attached to the wheel and the other to the shaft, directly or indirectly, or to a wheel fitted with stops, so that the action of the wheel, from the sudden travel of the piston-rod under the explosive force of the agency employed, is taken partly up by the spring and partly by the shaft in its rotation. The spring, after the travel of the piston has gone its full stroke, then acts upon the shaft to maintain a regular rotation of the fly-wheel, and consequently a more regular action of the power, and the mechanism which has to be moved by it. The spring may, however, be connected with the fly-wheel.

1985.—TAVERDON, C. L., Paris, "*A self-acting pump for winding and pumping, also for measuring liquids, and for other useful purposes.*" Patent dated May 11, 1876.

This invention consists of a cylinder in which a piston is fitted, having a rocking circular motion imparted to it by a crank on which it is arranged. The piston is slotted, and a cross-head or block is in the slot. The block is in connexion with a fixed plate, and forms with a ball on its end a knuckle or ball joint. The fixed end of the plate is in a pipe, through which air, gas, water, or other fluid or liquid can pass from one side of the plate to the other, the plate passing through an aperture in the cylinder in which it has an amount of play. In action, the air, gas, water, or other fluid or liquid passes along the entrance-pipe into the cylinder on one side of the plate, and presses against the piston, forcing it to follow its course under the rotation of the crank and its shaft, to which counting or other mechanism can be attached and driven. The air, gas, water, or other fluid or liquid passes round the periphery of the piston, and finds an outlet from the opposite side of the plate along the outflow-pipe.

2000.—MORGAN-BROWN, W., Southampton Buildings, London, "*An improved filtering reservoir worked by compressed air.*" A communication. Patent dated May 12, 1876.

This improved filtering reservoir consists in a case wherein, at a short distance from the bottom, an appropriate filtering medium is inserted, and above a space is reserved which acts like an air vessel. The water is introduced by a pipe from below, and traversing the filtering medium enters the upper chamber gradually, compressing the air therein contained, and from which it is withdrawn as required by means of a pipe. The lower chamber situated below the filter can be cleansed of the matter separated from the water, or other liquid filtered, by means of a pipe provided with a cock.

2050. — MORGAN-BROWN, W., Southampton Buildings, London, "*Improvements in self-closing valves.*" A communication. Patent dated May 16, 1876.

This invention relates to a device whereby a valve is made to be self-closing when the power used in opening it has been removed, and is constructed so as to obviate the hydraulic shocks resulting from the varying pressure of the feed water, and consists—

1. In connecting the regulating-valve to two pistons of different diameters, one situated above and the other below the valve, and provided with a peculiarly adjustable channel for the passage of the feed water to connect the chambers situated above and below, and otherwise separated by the pistons, thus causing the valve proper to close by the excess of pressure brought to bear upon the piston having the larger diameter.

2. In placing an air chamber between the valve proper and the feed water, the entrance channel to the chamber being partially obstructed by a diaphragm.

2080.—BISCHOF, G., Hart Street, Bloomsbury, London, "*Improvements in the purification of water and sewage, and in apparatus and materials employed in connexion therewith.*" Patent dated May 17, 1876.

The part of this invention which relates to the purification of water by filtration has reference more particularly to the construction and arrangements of filters, placed directly in the cistern or reservoir containing the water to be filtered or purified, such water being caused to pass through the filter, whence it is then conducted away to a storeage reservoir for filtered water.

The filters are constructed as follows:—The filtering materials are placed within a casing of stoneware, or other suitable material, resting upon one or more perforated bottoms therein, under which there is a small receptacle for filtered water provided with a tubule. This tubule is connected by a pipe passing through the side of the cistern and downwards to a regulator, for regulating the yield of filtered water according to the size of the filter. As the water enters the filter from the cistern through an aperture in its top, the action of the filter from ceasing, when the water-level in the cistern sinks below its top, is prevented by placing over the filter-case a bell-shaped hood reaching down to near the bottom of the cistern, in the top of which hood is a small air-valve. On first starting the filter the level of the water in the cistern should be above the top of the filter-case. The hood is then placed on with the air-valve open, so as to allow all air to escape from its interior, after which the valve is closed. The filter-case and hood being now filled with water, the water in the pipe leading down to the regulator will act as a syphon in drawing the water from the cistern up between the hood and filter-case, and down through the filter, and this action will continue till the water-level in the cistern has sunk below the bottom of the hood.

The regulator is in principle the same as that described in the patent No. 2243 of 1874; but in place of being contained in the filter-case itself, as there described, it is for cistern filters constructed separately, and placed at a certain depth below. The regulator consists of a pipe, by preference of tin, which passes through the side of a vertically inverted glass bottle or other suitable vessel. The one end of the pipe is provided with a plug or stopcock, while the other open end is connected to the pipe leading down from the filter. In the upper side of the pipe within the bottle or other vessel is a small hole, through which the filtered water flows from the filter into the regulator vessel, there being no other issue for the filtered water, so that by regulating the size of this hole the flow of the water through the spongy iron and other materials in the filter will be sufficiently retarded to prevent such materials from being disturbed, and allow a sufficiently long contact between them and the water to effect the thorough purification of the latter.

The regulating-pipe is secured to the side of the bottle or other vessel in a water-tight manner by flanges and caoutchouc washers, one of the flanges being screwed on over the open end of the pipe, and secured to the pipe leading from the filter-case. The filtered water is either withdrawn from the neck of the regulating vessel through a tap for immediate use, or, by preference, it passes thence through a tin pipe to the storeage reservoir for filtered water, whence it may be conducted to any part of the building. These storeage reservoirs consist of cylindrical vessels of earthenware or other suitable material, by preference with a funnel-shaped bottom with which the discharge-pipe communicates, so that the water can be entirely drawn off. The lids of these reservoirs are soldered or otherwise fixed down in an air-tight manner, and are provided with union screws for connecting the pipe from the regulator vessel, and another pipe which leads to the top of the reservoir for unfiltered water, and serves as an air-tube.

The invention relates further to the separation of the iron from water that has passed through a spongy iron filter, as described in patent No. 38 of 1873. Instead of employing limestone or animal charcoal for retaining the iron, as described in the specification, any other material that will act as a mechanical strainer, such as sand, coke, or asbestos, may be used for this purpose, provided that sufficient time be allowed for the oxidation of the iron in solution after the water has passed through the spongy iron, and before passing through the above-mentioned materials. With a view, however, of accelerating the oxidation of the iron in solution, the mineral known as pyrolusite or polyanite, which is manganic dioxide or peroxide in a finely granular state, is mixed with the sand or other materials, or such manganic dioxide may be used without sand or similar materials in combination with spongy iron.

The invention also consists in employing the manganic dioxide by itself as a purifying medium for water or sewage, using it either as a filtering medium by forming it into porous cylinders, slabs, or balls, and mixing it with cement or other binding material; or by grinding the spongy iron or manganic dioxide to a very fine powder, and mixing this powder with the water or sewage to be purified, using the substances either separately or in combination. They may either be mixed with the water or sewage by mechanical means, or they are preferably added gradually thereto, and caused to mix thoroughly with the liquid by its flow through the pipes or channels through which it is conducted to wherever required. The spongy iron is by this means dissolved or otherwise oxidized, and the oxide of iron thus produced is separated from water for domestic purposes by filtration through sand or through a mixture of sand and manganic dioxide in the ordinary subsiding reservoirs, whilst in the case of sewage such separation may in most cases be dispensed with, or be effected by subsidence as described.

2081.—ABEL, C. D., Southampton Buildings, London, "*Improvements in gas motor engines.*" A communication. Patent dated May 17, 1876.

According to this invention a combustible mixture of gas or vapour and air is introduced into the cylinder, together with air or other gas that may or may not support combustion, in such a manner that the particles of the combustible mixture are more or less dispersed in an isolated condition in the air or other gas, so that on ignition, instead of an explosion ensuing, the flame will be communicated gradually from one combustible particle to another, thereby effecting a gradual development of heat and a corresponding gradual expansion of the gases, which will enable the motive power so produced to be utilized in the most effective manner.

Various modes of using the gases and arrangements of the engine are described in the specification of this invention.

2124.—WEBB, W., Twickenham, Middlesex, "*An improved method of and machinery for separating the liquid and solid portions of sewage.*" Patent dated May 19, 1876.

This invention is designed to afford the means whereby the sewage of

towns may be treated to separate the solid from the liquid portions, so that the solid matter may be deposited in receptacles or places wherein it will be altogether inoffensive, and from which it may be taken to be utilized for fertilizing or other purposes, and the liquid may be filtered, purified, and deodorized before permitting it to escape.

For this purpose machinery or apparatus is employed provided with an endless screen or sieve, or two or more screens or sieves caused to travel around rollers or drums. The sewage matter is discharged or deposited from the sewer pipes or drains upon these screens, which retain the solid matter while permitting the liquid to pass through them. It is preferred that this machinery should be automatic or self-acting—that is to say, it should be so constructed and arranged that the weight of the sewage falling from the pipes or drains will cause the machine to operate without the assistance of any extraneous force or power. For this purpose it is provided with a wheel like a water-wheel, which is arranged under the sewage outfall, and geared with the axles of the screen, rollers, or drums. But if necessary or desirable the screens may be operated by steam, manual, or other power, and for this purpose the machine is provided with a crank or driving pulley or other means for connecting it with the driving power.

2147.—Mohr, F. W. B., Love Lane, London, "*Improvements in treating spent oxide of iron, obtained in the preparation of gas, to produce colouring matters and other products.*" Patent dated May 20, 1876.

According to this invention the spent oxide obtained from gas-works is carefully washed with water, in order to remove all soluble ammoniacal compounds, and the mass is digested with a solution of caustic soda or with lime water. To the clear liquor muriatic acid is added, and the whole heated slightly, and the liquor from the sulphur that is deposited is poured off. To the liquor thus obtained a salt of protoxide of iron and a small quantity of a solution of chloride of lime are added, and there is thus obtained a beautiful Prussian blue.

In order that the invention may be most fully understood and readily carried into effect, the inventor gives the following description of the manner in which he prefers to operate:—

"I submit the spent oxide of iron to the action of hot water in order to separate the soluble salts or compounds of ammonia, which may be further distilled with lime and collected in acid in the known manner. Secondly, I employ a livigating process, and, by the aid of water, eliminate the sawdust, or such like material usually mixed with the coal gas purifying agent. Third, I submit the residual spent oxide of iron to the action of a solution of a caustic alkali. I use by preference a saturated solution of caustic soda, and for every 100 parts of spent oxide I employ from three to ten parts of caustic soda (Na OHO), according as the spent oxide contains or will yield less or more Prussian blue. Fourth, I separate the solution thus obtained from the insoluble residue, and then neutralize and slightly acidify it with hydrochloric acid, or other mineral acid, in order that a portion of the sulphur contained therein may be liberated and be precipitated. The sulphur may be left to deposit by time, or it may be hastened by introducing into the liquor a little alumina or other indifferent insoluble substances. Fifth, after the sulphur has been deposited, I precipitate the products capable of producing colours or colouring matters by means of a salt of peroxide or protoxide of iron, either alone or in conjunction with an oxidizing agent, such, for example, as chloride of lime or atmospheric air."

2155.—Melling, T., Grassendale Park, Liverpool, "*Improvements in modes of and apparatus for regulating pressure in pipes or other conduits, and measuring and registering the quantity of water or other fluid flowing through them.*" Patent dated May 20, 1876.

This apparatus, for diminishing the pressure at any desirable points in mains or pipes containing water or other fluids, consists of a chamber, out of one side of which the exit-pipe proceeds, but is in free communication with it. The chamber has a valve-seat above and below, and in each of these is a valve, the lower one being usually made smaller than the upper one, but both turned or fixed on the same spindle, which projects upward through an outer stuffing-box to a lever, so that both valves are raised simultaneously. The water from the delivery-pipe presses upon the upper surface of the upper valve, and on the lower surface of the lower valve; and as the area of the former is greater than that of the latter, the pressure of the water or other fluid on the back of it (when it is released from the lever) closes it and keeps it closed. Connected with the exit-pipe is another cylinder, the axis of which is parallel to the axis of the valve-spindle, fitted with a water-tight piston, having a rod projecting outward. Both the piston-rod and the valve-spindle are jointed to a lever with a moveable weight at one end; their junction points with the lever being on opposite sides of the fulcrum, and as near as may be convenient to it.

The mode of working is as follows:—Pressure being exerted on the valves by the head of water in the main, they remain closed as long as the water in the exit-pipe is at or about its normal or required pressure, as regulated by the weight on the lever. The instant, however, water is drawn from the exit-pipe, the pressure falls slightly, and is no longer able by its pressure on the under surface of the piston, together with the unbalanced pressure of the head of water on the upper valve (after deducting the pressure on the lower valve) to counteract the effect of the weight on the lever. The valves consequently open a little, and continue to admit water so as to keep the pressure in the exit-pipe (acting under the piston) at the required pressure. The moment, however, the water ceases to be drawn from the exit-pipe, and the pressure therein rises, ever so slightly, above the normal pressure, the piston is raised, and the valves being thereby released from the upward pull of the lever are closed by the excess of pressure upon the upper, over that under the lower valve, assisted by their own gravity. Any further rise of pressure in the main exit-pipe is thereby prevented.

For measuring and registering the quantity of water flowing through the valve in a given time, the lever or other of the moving parts is caused to draw a diagram on a cylinder revolving by clockwork, after the manner of a steam-engine indicator, or in any other of the many well-known ways of effecting this object.

2162.—Massey, G., and Knott, H., Stalybridge, "*Improvements in the construction of taps for steam and other fluids and liquids.*" Provisional protection only obtained. Dated May 22, 1876.

This consists of a valve, the spindle of which fits in a plug screwed into the body of the tap. The valve is raised to open the tap by means of a cam fixed to a spindle, one end of which passes through a stuffing-box in the body of the tap, and it is turned round by a handle at the outside, the other end of the spindle fitting in a footstep in the body of the tap. After the valve has been opened by turning the handle, it is closed against the seating by the pressure of the fluid or liquid passing through it, and is consequently absolutely self-closing.

2166.—Ortmans, V. C. J., Brussels, "*An improved rotatory pump or apparatus for raising and forcing fluids, and for other purposes.*" Patent dated May 22, 1876.

This apparatus consists of a circular case or shell mounted on a suitable frame or bed-plate. The inner part of it forms a chamber of suitable size provided with an inlet and an outlet passage or pipe. The body of the apparatus is wider at its periphery than at its centre, having in transverse section somewhat the form of a double cone. From the central part of the body projects on each side a stuffing-box, which is traversed by a shaft, upon which is affixed the nave of a central circular disc or plate made of cast iron or other suitable metal. The disc or plate extends from the central shaft to the periphery of the chamber forming a partition, which divides the chamber into two parts, the periphery of the disc fitting into a depression or groove formed around the chamber. In the disc or plate are formed four or a suitable number of depressions or cavities, each of which is fitted with a butterfly-valve mounted upon a spindle or axis traversing the middle of the depression or cavity radially towards the centre of the plate. The depressions or cavities in the plate or disc are formed so that the butterfly-valves mounted upon their axes, as described, may be turned in one direction, so as to lie in and fill the depressions or cavities, and be completely embedded therein, and the butterfly-valves are formed so that when caused to rotate partially upon their axes in another direction they will extend on each side of the plate or disc as far as the inner sides of the body of the apparatus, and will form a series of moveable radial partitions, dividing the inner chamber of the apparatus into as many compartments as there are valves.

2171.—Faulkner, J., Manchester, "*Improved electrical appliances for lighting gas in public and private buildings.*" Provisional protection only obtained. Dated May 23, 1876.

This invention relates to the lighting of gas in large buildings where the gaslights are at a considerable distance from the ground, and cannot be conveniently got at by hand.

The principle of the invention consists in carrying a constant electric spark from burner to burner, instead of a lighted taper or torch, as at present, thereby preventing accidents from fire. To take a row of lights in a straight line, for example, there is placed at the back of the burners, or in any convenient place, as the necessity of the case may require, a guide rail or support to carry a travelling lighter. To the traveller is connected an arm, which comes nearly in contact with the gas-burners. Along this arm is placed a wire to admit the electric spark, which wire is connected or is part of a longer one reaching to the ground, or to the place most convenient to the operator. When the gas is required to be lighted, the attendant connects the wire to a battery coil and condenser, when a spark is immediately given out by the wire over the gas-burner, and the gas lighted. The traveller, with its arm and wire, is then caused to travel on the guide by means of a wire cord or chain, and, passing in front of or over each burner, ignites the gas by means of the constant spark issuing from the wire.

In some cases, to ensure ignition, a cup or spoon is placed on the end of the arm to collect the gas as it passes, such cup or spoon being made of any desired size, either to cover one or more burners.

In some cases separate wires are attached to the burners, which are caused to emit a spark over or under, and ignite the gas on coming in contact with the traveller as it passes on its way; and this plan is especially applicable where the arm of the carrier cannot be conveniently brought into close proximity to the burners, as, for instance, where globes or shades are used. Or, instead of connecting the wires to the battery coil and condenser, they may be placed on the traveller, and the electricity sent from the battery to actuate the coil.

2181.—Davies, P. J., King's Cross, London, "*Improvements in liquid meters.*" Provisional protection only obtained. Dated May 23, 1876.

This invention relates especially to liquid meters constructed on the principle of the "Barker's mill" or "reaction-wheel." Liquid meters of this description, as heretofore constructed, the inventor says, cease to register when the volume of liquid passing through them is reduced to a comparatively small stream; such small stream is, however, sometimes sufficient to amount to a considerable volume of liquid, when allowed to flow for a long period, and its passage through the meter without registration is obviously a serious loss to the seller. In order to obviate or modify this defect, he applies to the ends of the arms of the meter reaction-wheel flaps, valves, or such like appurtenances, so arranged and adapted that in proportion as the volume of liquid passing through the meter is reduced they close more or less, so as to contract the passage, and thus cause the liquid, although flowing in a very small stream, to issue from the outlets of the meter-wheel with sufficient velocity to produce reaction enough to turn the wheel, and register the quantity, even when it is reduced to a mere fraction of what would flow through the meter without registering under the arrangement heretofore practised.

2207.—Lake, W. R., Southampton Buildings, London, "*Improvements in implements for cutting pipes.*" A communication. Patent dated May 25, 1876.

This invention comprises a circumferential rib provided upon one of the anti-friction rollers of a pipe-cutter in such a manner that when the implement is in use the rib will circumferentially indent the outer surface of the pipe, and follow in the indentation during the operation of cutting, thereby preventing any slipping of the implement upon the pipe, and providing for the accurate action of the cutter thereon.

It further comprises—1. The combination of a moveable jaw, carrying a friction roller at its outer end or apex, with a triangularly-recessed fixed jaw, provided at each side of its recess with two or more rollers, the roller on the moveable jaw being coincident or in line with the apex of the recess in the fixed jaw, by means of which combination and arrangement the roller of the moveable jaw is fitted for passage into the recess of the fixed jaw in such manner as to grasp and hold pipes of any diameter during the cutting operation. 2. A combination of a square-nosed cutter actuated by one handle of the implement, with a fixed jaw recessed for the reception of the pipe while it is being cut, and a moveable jaw actuated by the other handle, whereby provision is made for cutting the pipe without leaving any burr upon the cut end thereof after cutting. 3. The combination in the open-jawed pipe-cutter of a moveable cutter provided in a recess in the side of the cutter stock, and in a plane passing by the ends of the rollers of the fixed jaw, whereby the implement is made capable of cutting pipes close to the extreme ends thereof, cleanly and symmetrically, and without any necessity for extra or unusual care or skill. 4. A combination of parts, whereby, when occasion requires, the cutter may be readily detached from the implement, for sharpening, and as readily replaced for use.

2243.—Butler, G., Southwark, "*Improvements in valves or cocks.*" Patent dated May 27, 1876.

This invention relates more particularly to ball or float valves intended for regulating the supply of water or other liquids under high pressure to cisterns and similar receptacles, and has for its object utilizing the pressure of the liquid for assisting the rising of the ball or float, and the maintaining of the valve upon its seat in the most advantageous manner in order to promote increased steadiness of action, and obviate the concussion to which the ordinary apparatus is liable.

The apparatus is constructed in the following manner:—The inlet branch for the liquid is arranged horizontally or nearly so, and terminates in a chamber of a globular or other enlarged or expanded form, in the centre of which is situated the outlet branch, which is placed vertically and extends to a suitable height above the inlet. The chamber and the upper end of the outlet branch are formed with a flange or with projections so

arranged as to leave an annular space, or segmento-annular spaces, for the passage of the liquid, whilst at the same time exercising a restrictive action upon the incoming liquid, and thereby preventing any shaking or tremulous motion on the valve; or there may be employed a partition extending across between the exterior of the outlet branch and the side of the chamber, with a single orifice of small diameter for the passage of the liquid. The valve consists of a disc of metal, faced on its under side with leather, india-rubber, or other suitable material, and provided on its upper side with a stem or projection, which enters a guide way formed in a cover screwed or otherwise fitted to the top of the chamber. This cover constitutes an air chamber for receiving the air from the valve when in the act of closing, and thus obviating concussion. A spindle attached to the under side of the valve passes down the interior of the outlet branch, and is connected at its lower end to the short arm of the lever carrying the ball or float. This lever, which is by preference centred to lugs formed on the exterior of the outlet branch, passes into the interior thereof through an opening provided for the purpose, and enters a slot in the lower end of the valve spindle, so that the ball or float and the valve work in unison. As the liquid rises in the cistern it carries with it the ball or float, causing the valve to approach its seat, whilst at the same time the incoming liquid, by acting upon the top of the valve, assists in effecting the closing of the same.

2254.—Beldam, A., Fenchurch Street, London, "*An improved packing for the stuffing-boxes of steam-engines and pumps, and for other joints requiring to be made steam, air, or water tight.*" Patent dated May 29, 1876.

According to this invention a thin sheet of white or other suitable metal is corrugated, folded, or pleated, and then covered with a suitable lubricating grease, then a layer of canvas, felt, or other fibrous material, and then a second layer of grease. The whole is then spirally rolled up in a lateral direction across the corrugations or pleats until the packing attains the desired thickness, the outside layer being canvas, felt, or other fibrous material, and the packing being composed of alternate layers of canvas, felt, or other fibrous material, lubricating grease, and pleated metal. The fact of having the metal corrugated, folded, or pleated allows the packing to be bent into any sized circle without fracture.

2299.—Johnson, J. H., Lincoln's Inn Fields, London, "*Improvements in gas-meters.*" A communication. Provisional protection only obtained. Dated May 31, 1876.

In this invention the measuring-drums or wheels of wet gas-meters are constructed with any suitable number of returning or compensating chambers; and, in order to impede the action of the measuring-drum as little as possible, they are so made as to work and act with, and in the same direction as, the measuring-drums themselves, being for the purpose of returning to the measuring-drum any surplus quantity of gas passed or measured in consequence of the lowering of the water-line. The inlets to the chambers are constructed at about the same distance from the axis of the measuring-drum as the highest water-line or water-circle. The bodies extend from the inlets to, or nearly to, the outer circumference of the measuring-drum, and the inlets open in succession to the measured gas, and their outlets to the unmeasured gas. Each chamber is constructed with a small water seal or valve, which may be made in various forms, and acts in the following manner:—When the returning chambers rise above the water, the water seal or valve is closed, and remains so by the pressure of the measured gas until the inlet of the acting chamber becomes sealed by dipping into the water; the onward motion of the drum then causes the gas in the chamber to become expanded or rarefied, and the greater pressure of the unmeasured gas on the other side of the seal opens it, and the remaining portion of the chamber is filled with unmeasured gas.

The chambers are constructed in a curved form, and when in action, returning surplus measured gas to the measuring-drums, their inlets are situated for the most part on one side, and their bodies and outlets on the other side, of a vertical line drawn through the axis of the measuring-drum. Consequently their inlets are descending towards the lowered water-line at the same time that their bodies are ascending above the water-line, and are filling with surplus measured gas to be returned to the measuring-drum. But the bodies of the returning chambers being situated at a greater distance than the inlets from the axis of the measuring-drum, ascend through a proportionally greater space than the inlets descend through in the same time, by which arrangement sufficient space is obtained in the chambers to contain the surplus measured gas to be returned.

According to one modification the measuring portion of the drums is made in the usual manner, only leaving the body or outer rim something deeper or broader, to give space for the syphon, but, in lieu of using the ordinary hollow cover, a flat or partially flat one, or one stamped up in suitable curves, is employed, which also serves for the exterior of the curved returning or compensating chambers.

According to another modification the returning chambers are constructed on the body or outer rim of the drum, and are connected by curved tubes, having their inlets about the same distance from the axis of the measuring-drums as the highest water-line or water-circle.

2314.—Deacon, G. F., Liverpool, "*Improvements in valves for reducing or regulating fluid pressure.*" Patent dated June 1, 1876.

This invention consists of a valve of simple construction, which will so act that while the velocity of the fluid passing through it may be variable, and also the inlet pressure, the action of the valve will reduce that pressure to any desired constant, or nearly constant, pressure.

In the reducing valve, constructed according to these improvements, the resultant pressure acts on a piston or ram capable of moving longitudinally in a cylinder, and held against that pressure by a counter pressure, which may be either a weight or a spring or other equivalent, which is usually made to act at the end of a lever. The piston or ram is attached to a balanced valve in such a manner that when the resultant pressure on the piston or ram falls short of, or exceeds, the counter pressure, the piston or ram being no longer balanced, tends respectively to open or close the valve, and thus to maintain the approximate constancy of the resultant pressure. By this arrangement the initial pressure has little or no influence over the resultant pressure, which depends upon the relation between the area of the piston or valve and the counter pressure.

APPLICATIONS FOR LETTERS PATENT.

3571.—Gray, J., Glasgow, "Improvements in treating and utilizing sewage and other refuse or waste matters; also in apparatus or arrangements therefor; and also in making preparations of lime therefor, and applicable to other useful purposes." Sept. 22, 1877.

3603.—Adams, G. A., Peel, Isle of Man, "An improved meter for taps or other similar articles." Sept. 26, 1877.

3606.—Towle, J., Coldarbour, Oxford, "Removing all sewage, both solid and fluid, from towns quite away every 24 hours, so that no decomposition can take place to throw off poisonous gases." Sept. 26, 1877.

3618.—Longshaw, J., Warrington, Lancs, "Improvements in the method of and apparatus for lighting street and other gas-lamps." Sept. 27, 1877.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

1160.—Wilson, W. P., Peckham, London, "Improvements in apparatus used in the manufacture of gas." March 24, 1877.

1209.—Verstraeten, T., Brussels, "Improvements in joining together the ends of pipes and tubes." March 27, 1877.

1223.—Sirié, C. A., Paris, "An improved apparatus for carburetting lighting gas." March 28, 1877.

1250.—Brinjes, J. F., Whitechapel, London, "Improvements in machinery or apparatus for raising, forcing, and exhausting water and other liquids, also air and gases." March 29, 1877.

1287.—Wotherspoon, J., Glasgow, "An improvement in the construction of cocks or taps." April 3, 1877.

1533.—Lake, W. R., "Improved apparatus for lighting and extinguishing gas." A communication. April 19, 1877.

2249.—Strong, M. H., Brooklyn, U.S.A., "Improvements in the manufacture of gas for illuminating and other purposes." June 9, 1877.

2334.—Robson, J., North Shields, Northumberland, "Improvements in engines operated by the combustion of gas or vapour." June 14, 1877.

2943.—Tyer, E., Finsbury, London, "Improvements in float-valves for cisterns." Aug. 1, 1877.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

3058.—Lake, W. R., "Improvements in portable hydrogen and carburetted hydrogen gas apparatus." Sept. 5, 1874.

3095.—Rowbottom, J., "Improvements in retorts and in means or apparatus for charging and discharging the same." Sept. 9, 1874.

3152.—Pocock, A. W., "Improvements in compensating wet gas-meters." Sept. 15, 1874.

3178.—Newton, W. E., "Improvements in filters for filtering or purifying water and other liquids." Sept. 17, 1874.

3225.—M'Intyre, J., "Improvements in apparatus for purifying sewage waters." Sept. 21, 1874.

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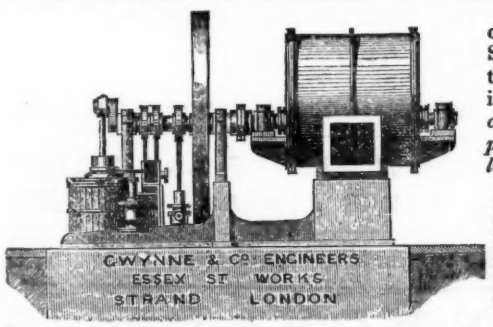

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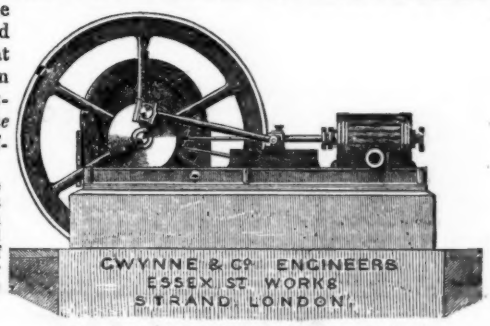

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WANTED, by a Young Man who has served his apprenticeship to a Gas Engineer, a situation as MANAGER of a small Gas-Works, or to act as Assistant to the Engineer of a large Works; has had good practical experience, and can be strongly recommended.
Address No. 382, care of MR. King, 11, Bolt Court, FLEET STREET. E.C.

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WANTED, in the Gas Engineer's Office, a competent ASSISTANT. He must be able to make surveys, take levels, prepare plans for Gas-Works apparatus and machinery, whether for new works or extensions, and attend to and carry out the usual duties incident to such an office.
Apply, with copies of testimonials, and stating salary required, to the undersigned,
M. OGLE TARBOTTON, Engineer.
Gas Office, George Street, Nottingham,
Sept., 1877.

GAS-FITTER Wanted. Must be efficient in indoor and outdoor work, and able to give good references.
Apply to R. W. BRETT, Gas-Works, HERTFORD.

SPENT OXIDE—About Thirty Tons to DISPOSE OF.
Samples on application to EDWARD HOWELL, Manager, Gas-Works, YEOVIL.

FOR SALE—Three 10-feet square PURIFIERS, with lids, wood sieves, and lifting gear. Also Two 6-feet square PURIFIERS, with lids, wood sieves, and lifting gear.
Also One 10-inch CENTRE-VALVE, by Messrs. C. and W. Walker, and Two 10-inch Four-way VALVES.
The whole will be sold cheap to effect an immediate removal.
Apply at the GAS-WORKS, Bromley, KENT.

FOR SALE—One Exhauster by Jones, of Birmingham, capacity 25,000 feet per hour, with bye-pass, 12-in. inlet and outlet pipes and valves complete, in first-class working condition, price £40; also one Exhauster Regulator, with chain and weights complete, price £5.
Apply to CLAPHAM BROS., Ironfounders, &c., Keighley, YORKS.

GASHOLDER FOR SALE.

ONE Telescopic Gasholder, 70 feet by 20 feet, complete, with cast-iron tank, columns, girders, and inlet and outlet pipes, valves, &c., of modern construction. In first-class condition, and made by Messrs. Piggott and Co., of Birmingham.
To be seen at work at the Gas-Works, Birkenhead.
Cause of removal to make room for extensions.
To be sold a bargain, taken down, and re-erected ready for work.
For particulars, apply to MESSRS. ASHMORE AND WHILE, STOCKTON-ON-TEES, or to view to Mr. CALLOW, Gas Engineer, BIRKENHEAD.

GAS PLANT FOR SALE, suitable for Small Works:—
Seventeen 4-inch and 3-inch H-Pipes.
Eighteen 15-inch Circular Mouthpieces.
A 6-inch Governor.
A Station-Meter, to pass 6000 cubic feet per hour.
Scrubber and Washer combined; very good.
Vertical Condenser; very good.
Seven 7-feet lengths, 12-inch D-shaped Hydraulic Main.
Two Gasholders, each capable of holding 15,000 cubic feet.
Apply to the ENGINEER, Phœnix Gas Company, GREENWICH.

THE Newton Improvement Commissioners invite TENDERS for the construction and erection of a Double-lift GASHOLDER, 60 ft. diameter and 36 ft. high, at their Gas-Works, Newton-in-Mackerfield, Lancashire, according to drawings and specifications which may be seen at my Office, Town-Hall, to whom tenders are to be forwarded, endorsed "Gasholder," not later than the 13th of October next.
The lowest or any tender not necessarily accepted.
R. BRIERLEY, Engineer and Surveyor.
Newton-le-Willows, Sept. 29, 1877.

THE Gas Committee of the Leeds Corporation are prepared to receive OFFERS for One STATION-METER, capacity 30,000 feet per hour, and One DRUM of similar capacity.
Also several Jones's EXHAUSTERS of various sizes, with engines, shafting, &c., complete. All in excellent condition.
Further information can be had on application to Mr. Woodall, Engineer.
Offers to be addressed to the Chairman of the Gas Committee, Town-Hall, Leeds.
By order,
C. A. CURWOOD, Town-Clerk.
Leeds, Sept. 17, 1877.

REMOVAL.

CHARLES HEISCH, F.C.S., Analytical and Consulting Chemist, Superintending Gas Examiner to the Corporation of London, &c., &c., has REMOVED from 8, Savage Gardens, to 79, MARK LANE, where he may be consulted as usual.

THE Corporation of Middlesbrough are prepared to receive TENDERS for BUILDING a GASHOLDER-TANK, proposed to be erected near the North-Eastern Railway Goods Station, at Middlesbrough.
There will be plans showing two schemes—prepared by Mr. Richard Cail, of Newcastle, and Mr. George Livesey, of London, respectively—for building this Tank, and Contractors are at liberty to tender for either or both.
Plans and specifications are now ready, and may be seen at the Gas Manager's Office, Gas-Works, Middlesbrough.
Plans and specifications and quantities, showing Mr. Cail's scheme, may also be seen at his Office, 5, Dean Street, Newcastle-on-Tyne.
Tenders, endorsed "Tender for GAS-Tank," to be sent addressed to the Town-Clerk, not later than Thursday, Oct. 3, 1877.
It is to be understood that the Corporation do not pledge themselves to accept the lowest or any tender, nor will anything be allowed to parties tendering.
By order,
GEORGE BAINBRIDGE, Town-Clerk.
Corporation Hall, Middlesbrough,
Sept. 12, 1877.

THE GUILDFORD GASLIGHT AND COKE COMPANY.

THE Directors of the above Company are prepared to receive TENDERS for the supply of 500 Tons of CANNEL, delivered free at the Railway Station, Guildford.
All tenders must be endorsed "Tender for Cannel," and delivered to J. R. Capron, Esq., Guildford, on or before Monday, Oct. 8, 1877.
Any further required information can be obtained on application to Mr. LONGWORTH, Dukinfield, MANCHESTER.

NOTICE.

MESSRS. THOMAS DOCWRA & SON, Contractors, Balls Pond Road, hereby give notice that they have no business connexion with any other person of the same name.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.
Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 22, Great George Street, WESTMINSTER.

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CONTRACTORS FOR THE
PURIFICATION OF COAL GAS,
BY THEIR
PATENT OXIDE OF IRON COMPOUND.

The material is in use at most of the principal Gas-Works in Yorkshire and elsewhere. It contains considerably less moisture than natural Oxide of Iron. It is much cheaper and more efficient as a purifying agent.
B. & H. are purchasers of Spent Oxide, or will take Spent in exchange for New Material.
FOR SAMPLES AND TERMS, ADDRESS—
BAILES & HALLSWORTH, COPPERAS WORKS, ARMLEY, LEEDS.

J. T. B. PORTER & CO.,
GAS ENGINEERS & MANUFACTURERS,
IRONFOUNDERS AND CONTRACTORS,
GOWTS BRIDGE WORKS,
LINCOLN.

LONDON OFFICES: 1, WESTMINSTER CHAMBERS, S.W.

ESTIMATES FOR GAS-WORKS OF ANY SIZE.
REFERENCES TO 500 WORKS ALREADY ERECTED.

N.B.—All Communications to be addressed to the FIRM ONLY.

NOTICE OF REMOVAL.
D. BRUCE PEEBLES & CO.
Beg to announce that they have REMOVED to their New Premises,
TAY WORKS, BONNINGTON, EDINBURGH,
To which all communications should now be addressed.
May 30, 1877.

THE UNIVERSAL
GASLIGHT IMPROVEMENT COMPANY,
LIMITED.

CAPITAL, £100,000 STERLING, IN 10,000 SHARES OF £10 EACH.

Subscriptions are invited for 5000 Shares of £10 each, or £50,000 of the Capital of the Company.

Deposit of £1 per Share on application. Future Calls will be made as required, and as the Progress of the Company warrants, but at intervals of not less than Three Months.

DIRECTORS { M. E. ROBINOW, Esq. (Messrs. Robinows and Marjoribanks), Glasgow.
ROBERT KING, Esq. (Messrs. Hurlet and Campsie Alum Company), Glasgow.
ALEXANDER DONALDSON, Esq. (Messrs. James Watson and Co.), Glasgow.
S. STEWART, Esq., Manager, Gas-Works, Greenock.
HENRY AITKEN, Esq., Falkirk.

SOLICITORS—Messrs. MONCRIEFF, PATERSON, FORBES, and BARR, 45, West George Street, Glasgow.

CONSULTING CHEMIST—Dr. WALLACE, F.R.S.E., F.C.S., Public Analyst and Gas Examiner for the City of Glasgow.

SHAREBROKERS { Messrs. M'COWAN and HOUSTOUN, 87, St. Vincent Street, Glasgow.
Messrs. BELL and BEGG, 8, North St. David Street, Edinburgh.

BANKERS—THE CLYDESDALE BANKING COMPANY, GLASGOW, AND BRANCHES.

SECRETARY (*pro tem.*)—Mr. A. M'D. HOUSTOUN, 87, St. Vincent Street, Glasgow.

PROSPECTUS.

This Company has been formed for acquiring, working, leasing out, selling, and granting licences for, and also for erecting apparatus for working Patent No. 2587, July 24, 1874, granted to Henry Aitken, Falkirk, for Improvements in the Manufacture of Illuminating Gas, and in the apparatus or means employed therefor; and Patent No. 2725, Aug. 3, 1875, granted to Henry Aitken, Falkirk, and William Young, Clippens, Renfrewshire, also for Improvements in the same.

The objects of these patents are the treatment of Gases in their condensation, or cooling down, so as not to allow the Tars to take from them the Naphthas or lighter Hydrocarbons, upon which, in a great measure, their illuminating power depends; or the treatment of the Tars in such a way as to give up to the Gases such portions of the Hydrocarbons as they may have absorbed. Further, the augmentation of the quality of Gases of low illuminating power, produced from common Coal, &c., by the application of Hydrocarbons produced from Shale, Oil, &c.

The leading advantages of the present inventions may briefly be stated as follows:—

1. Gas of a higher illuminating power is obtained from any Coal or Shale than formerly, so that gas manufacturers making Gas from common Coal only can most materially increase the illuminating power of their Gas at the same cost for Coal.
2. Gas manufacturers making Gas of a high illuminating power are enabled to do so from cheaper Parrot Coal, common Coals, and Shales, dispensing with the use of high-priced Cannels. And
3. A saving of cost in the purification from less Lime being used.

The inventions have been before the Gas community for more than a year, and have been favourably criticized; and inquiries have been made by Gas Managers both at home and abroad with a view to their adoption.

The first-mentioned patent has been in operation on a large scale for more than a year, at Hamilton Gas-Works, and during that time the whole Gas supply for Hamilton has been treated under the patent. It has given the Gas Committee of the Corporation every satisfaction.

The process as conducted at Hamilton has been investigated by a committee of the West of Scotland Association of Gas Managers, and also by Dr. Wallace, Gas Examiner for the City of Glasgow.

The reports made by these authorities show that, as compared with the old mode of working, the illuminating power of the Gas under the new treatment is increased, taking the average results of the trials, by 18½ per cent., or, in other words, the illuminating power of the Gas is increased by 4¼ candles.

It was found also that the cost of purifying under the new system was considerably less than under the old, the saving in Lime alone being about 12 per cent. It is, therefore, as testified by Dr. Wallace in his Report, "undoubtedly a great step in the art of Gas-making."

Patents have also been secured in most of the continental countries, and in India and Canada, which have all been included in the sale to the Company, and the Company may also, under their constitution, acquire or take out, in the United Kingdom or abroad, patents in addition to those specified above, for future inventions or discoveries in connexion with improvements in the manufacture of Gas or other illuminants and relative apparatus. As the quantity of Coal made into Illuminating Gas in the United Kingdom alone is estimated to be ten million tons per annum, there is a very wide field for the operations of the Company, with every prospect of a profitable result.

Intending subscribers are referred to the Report on the process by a Sub-Committee of the West of Scotland Association of Gas Managers, and to the discussion thereon at the Association's meeting, as contained in the JOURNAL OF GAS LIGHTING of the 15th and 22nd of May, 1877, and copies of Dr. Wallace's Report may be had on application to the Solicitors or the Brokers.

An agreement has been entered into between Henry Aitken, of Falkirk, in the county of Stirling, Coalmaster, *of the first part;* and Andrew M'Dowall Houstoun, 87, St. Vincent Street, Glasgow, on behalf of the company, *of the second part;* dated the 13th of September, 1877, containing the terms on which the Company acquire the above-mentioned Patents, and all prolongations thereof or improvements thereon. It can be seen in the hands of the Solicitors, but it may be mentioned that its principal conditions are—

1. Payment to Mr. Aitken of sums he has expended in taking out and working the Patents, amounting to £1800.
2. Mr. Aitken to get 5000 paid-up shares of the capital of the Company, but to reap no benefit therefrom in any year till the holders of the 5000 ordinary shares for which subscription is now asked shall have been paid 10 per cent. per annum on the amount called up; after which Mr. Aitken's shares will draw, on an amount equal to that paid up on the ordinary shares, a dividend at the same rate, and thereafter the shares will rank equally. And
3. So soon as the holders of the 5000 shares for which subscription is now asked shall have been paid in dividends an amount equal to their called-up capital, with interest at the rate of 10 per cent. per annum on the same from the dates of the calls, the distinction between Mr. Aitken's shares and the others shall cease.

Applications for shares to be made in the following form:—

TO THE DIRECTORS OF

THE UNIVERSAL GASLIGHT IMPROVEMENT COMPANY, LIMITED.

GENTLEMEN,—Having paid to the credit of your Company with the Clydesdale Banking Company the sum of_____ Pounds, being £_____ per Share on my application for_____ A Shares of £10 each in your Company, I request you to allot to me that number of Shares; and I hereby agree to accept the same, or any less number that may be allotted to me, and to pay the balance in respect thereof when called on, in terms of the Prospectus and Articles of Association; and I further authorize you to place my name upon the Register of Shareholders for the Shares so allotted.

*Name (in full)*_____
*Address*_____
*Profession (if any)*_____
*Date*_____
*Signature*_____

KING'S COLLEGE, LONDON.
EVENING CLASS DEPARTMENT.
WINTER SESSION, 1877-78.
Chemistry, at 7 p.m.—Monday, Oct. 8; Thursday, Oct. 11 Mr. W. N. HARTLEY.
Analytical Chemistry, from 7 till 9 p.m.—Tuesday, Oct. 9. Mr. W. N. HARTLEY.
Fee for the Course of Lectures, £1 11s. 6d.; for the Laboratory, £2 2s. The session terminates in March.

MICHAEL & WILL'S GAS AND WATER SUPPLY.

This day is published, second edition, 8vo., 25s., cloth,

THE LAW RELATING TO GAS AND WATER: comprising the Rights and Duties, as well of Local Authorities as of Private Companies, in regard thereto, and including all Legislation to the close of the last Session of Parliament. Second Edition. By W. H. MICHAEL and J. SHIRESS WILL, of the Middle Temple, Esqs., Barristers-at-Law.
London: BUTTERWORTHS, 7, FLEET STREET, Her Majesty's Law Publishers.

T. NEWBIGGING,
CONSULTING GAS ENGINEER,
5, NORFOLK STREET, MANCHESTER.

HENRY LYON,
ENGINEER,
AND
CONSULTING GAS ENGINEER,
BARTON HOUSE, opposite BARTON ARCADE,
DEANSGATE, MANCHESTER.

ALFRED LASS,
SPECIAL ACCOUNTANT FOR GAS COMPANIES,
30, GRACECHURCH STREET, LONDON.

Accounts analyzed and Statistics Prepared for Parliamentary Proceedings, Arbitrations, &c.
The Forms of Account, which have been specially designed by A. L. to meet the requirements of the Gas-Works Clauses Amendment Act, 1871, are now in use by many Gas Companies, and have been universally approved.
The above forms are registered.
Water Companies Accounts also prepared and adjusted.
CONSULTATIONS.

GARSIDE'S IMPROVED MAIN DRILLING CLIP.
No. 1 takes from 2-in. to 6-in. Mains.
No. 2 takes from 6-in. to 12-in. Mains.
GARSIDE'S REGISTERED TUBE-VICE takes ⅜ brass to a 2-in. Socket.
May be had direct from the maker, SAMUEL GARSIDE, Gatefield Iron-Works, ASHTON-UNDER-LYNE.

CATHELS'S Patent Gas-Washer is an excellent cleanser of gas from tar, ammonia, sulphur, and carbonic acid, reducing the cost of subsequent purification 30 to 50 per cent. Needs no motive power or attention beyond drawing off and recharging as required. Has no moving parts or complications to get out of order. Is of moderate cost, and is practically indestructible.
Application to be made to the MANUFACTURERS, the Horseley Company, Tipton, STAFFORDSHIRE.

ADDISON POTTER,
WILLINGTON QUAY,
NEAR NEWCASTLE-UPON-TYNE,
Manufacturer of
CLAY RETORTS, FIRE-BRICKS, AND EVERY DESCRIPTION OF FIRE-CLAY GOODS

THOMAS CARR & SON,
MANUFACTURERS OF
FIRE-BRICKS, LUMPS, TILES, RETORTS,
&c., &c.,
SCOTSWOOD FIRE-BRICK WORKS,
SCOTSWOOD-ON-TYNE.

BOUCK & CO., LIMITED,
TAR DISTILLERS & MANUFACTURING CHEMISTS,
MILES PLATTING, MANCHESTER.
BUYERS OF COAL TAR,
And Crude Products therefrom,
AMMONIACAL LIQUOR, &c.

JOHN ROMANS, C.E., F.G.S.E.,
CONSULTING GAS ENGINEER
AND
CANNEL COAL FACTOR,
30, St. Andrew Square, EDINBURGH.

Plans and Estimates furnished; Gas-Works, Apparatus, Pipes, Machinery, Fire Goods, &c., supplied, or Attested and Shipped for Exportation.
GAS-WORKS TAKEN ON LEASE.

Mr. ROMANS has for upwards of 30 years been practically engaged in the Manufacture of Gas, and has, by extensive experiments, ascertained that by JUDICIOUS INTERMIXTURE of the lighter with the heavier gases, much of the rich Hydrocarbons CAN BE SAVED, which otherwise ARE LOST, during the process of manufacture. He is therefore enabled to give advice to those who favour him with their orders for Cannel, as to the class which will secure for their standard of illuminating power the HIGHEST ADVANTAGEOUS RESULTS.

ANALYSIS AND PRICES FORWARDED ON APPLICATION.

NOTICE.
THE GAS & WATER COMPANIES DIRECTORY,
1878.
(GAS SECTION.)
The Editor will feel greatly obliged if Secretaries and Engineers would fill up, and return to him at once, the forms sent them, as the work is now going to press. If any have not received Forms, they will be forwarded immediately, on application to the Editor,
CHARLES W. HASTINGS,
8, BUCKINGHAM STREET, ADELPHI, LONDON, W.C.

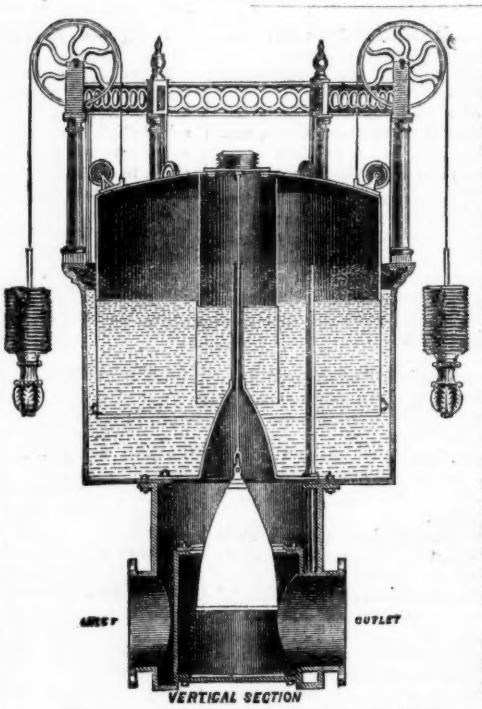
THE THAMES BANK IRON COMPANY,
(Successors to LYNCH WHITE,)
SUPPLY FROM STOCK
CAST-IRON RETORTS, SOCKET-PIPES for GAS or WATER PURPOSES, FLANGE-PIPES for STEAM, RAIN-WATER PIPES and GUTTERS, HOT-WATER PIPES and BOILERS, and all requisite Connexions for same; also LAMP-COLUMNS, LAMPS, WROUGHT FRAMES, WROUGHT-IRON TUBING, &c., &c.
All kinds of Gas-Works Apparatus and General Castings made to Pattern or Drawing.
ADDRESS—
OLD BARGE WHARF, UPPER GROUND STREET, LONDON, S.E.

B. GIBBONS, JUN.,
DIBDALE FIRE-CLAY, BRICK, AND GAS-RETORT WORKS,
STOURBRIDGE (Established 1834),
MANUFACTURER OF EVERY DESCRIPTION OF
Burs, Lumps, Stays, Shields & other Bricks, & Gas-Retorts.
A LARGE QUANTITY OF RETORTS ALWAYS IN STOCK.

Circular .	14 in.,	15 in.,	16 in.,	18 in.
Ovals . .	17 in. × 14 in.,	17 in. × 15 in.,	20 in. × 15 in.,	21 in. × 15 in., &c.
D's. . .	14 in. × 14 in.,	15 in. × 12 in.,	15 in. × 13 in.,	17 in. × 14 in., 18 in. × 13 in.
	18 in. × 15 in.,	20 in. × 16 in.,	22 in. × 14 in.,	24 in. × 14 in., 24 in. × 15 in., &c.

Special attention given to the execution of Export Orders.

J. & J. BRADDOCK,
GLOBE METER-WORKS,
OLDHAM,
Beg to submit to Gas Engineers their
PATENT COMPENSATING GAS GOVERNOR,
Which is designed to give an uniform pressure at the Outlet to the Main at all draughts up to the full quantities which the Governors are made to control, such outlet pressure being less than the initial pressure.



VERTICAL SECTION

The uniformity of pressure is obtained by introducing a compensating chamber into the Bell or Holder of the Governor, which compensator is of the same area as the valve, both of which are operated on by the initial pressure, thereby placing the valve in equilibrium, no matter what the initial pressure may be. The action on the Bell is by the Gas passing along a pipe from the outlet, and the pressure is regulated by weights in connexion with the Bell as required.
From the sectional elevation attached hereto, it will be seen that only the Gas required to operate the Bell comes in contact with the water of the tank, which water will remain comparatively sweet and free from odour. That in case of accident to the Bell, no more Gas can escape than would pass up the pipe covering the valve-rod and Bell supply-pipe.
These Governors have been made and sent out of various sizes for from 2 to 24-inch Mains, and give most satisfactory results.
They can be made with Float in the Bell, or counterpoise as per section.

ECONOMY IN THE PRODUCTION OF GAS.

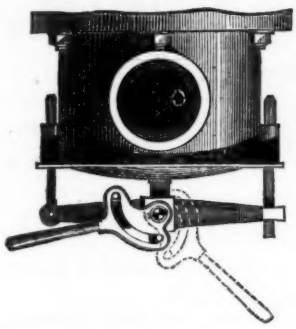
PLUTONIC CEMENT,

For Jointing and Repairing Retorts and Ovens *in* action and *out* of action.

A Pamphlet on the advantages of the above, with modes of Application, References, Prices, &c., free by post, from the Sole Manufacturer,

WILLIAM RICHARDSON, GAS AND HYDRAULIC ENGINEER,

CHARLES HENRY STREET AND BISSELL STREET, BIRMINGHAM.



STORER & PUGH'S

PATENT

RETORT-LID FASTENINGS

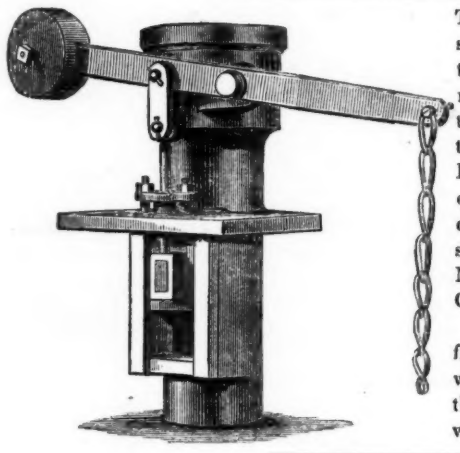
Have now stood the test of experience, and have been found one of the greatest improvements in retort-house appliances yet invented. All who desire security and economy should give them a trial.

Prices and further particulars will be given on application to

J. STORER,

GAS-WORKS, STAFFORD.

MOORE'S PATENT DIP-PIPE.



THE advantages of this Dip will be seen from the engraving. It is thoroughly effectual in its working, removing the whole of the pressure of the hydraulic main from the retort, thus causing a great saving in gas. It is very easy of manipulation, requiring little care and attention; it cannot get out of order, and, when shut, works as an ordinary Dip-Pipe. No accumulation of carbon in retort. Can be fixed to existing H-pipes.

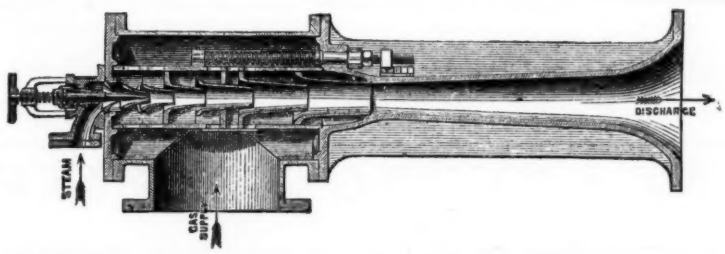
In ordering the Dip, the distance from top side of hydraulic main to water-level should be stated; also the Dip at which it is required to work when the valve is shut.

PRICES—3-in., 35s.; 4-in., 42s.; 5-in., 48s.

SOLE AGENT: J. GILL, GAS-WORKS, BRIDGENORTH,

To whom all communications should be addressed.

MAKERS: THE COALBROOKDALE COMPANY, SHROPSHIRE.



KÖRTING'S STEAM-JET GAS-EXHAUSTER.

IMPROVED CLELAND'S PATENT.

UPWARDS OF 250 IN USE.

CLELAND'S PATENT CONDENSER AND STEAM SCRUBBER.

FOR PARTICULARS, APPLY TO

KÖRTING BROS.,

17, LANCASTER AVENUE, MANCHESTER,

OR TO

GERALD J. TUPP, 8, John Street, Adelphi, W.C.,

LONDON,

SOLE AGENT FOR ENGLAND AND WALES.

BELGIAN CLAY RETORTS.

J. SUGG and CO., late ALBERT KELLER, GHENT.—The removal of the import duties on Earthenware permitting the entry of Clay Retorts into England, Messrs. Sugg, of Ghent, beg to draw the attention of the Gas Companies of London, and other Cities, to the very superior quality of the RETORTS manufactured by them. They can be made of any size, in one piece, and of any form. The price will be in proportion to the weight, and very moderate in comparison to their value.

Communications addressed to J. SUGG & CO., GHENT, will receive immediate attention.

JAMES NEWTON & SONS,

(Established 1820,)

FIRE-BRICK AND TILE MERCHANTS,

Wholesale and for Exportation,

FALCON DOCK, 78 AND 79, BANKSIDE,

SOUTHWARK, LONDON, S.E.,

DEPÔT for STOURBRIDGE AND NEWCASTLE FIRE-BRICKS, LUMPS, TILES, and FIRE-CLAY, and every Article suitable for

GAS AND WATER WORKS.

HEBBURN MAIN GAS COALS.

T. Stone, Esq., of Weymouth, writes on Nov. 17, 1876: "I have used about 12,000 tons of this Coal, with, I think, the best possible results, although not always under the most favourable circumstances. My Coal account made up to Midsummer last showed a makeage of 10,524 cubic feet per ton of 14½-candle gas, and not a hundredweight of Cannel used. This statement would, I know, be incredible to many men, and may provoke the remark, 'How much of it is paid for?' For the gratification of such, I have to say that, of the above quantity, 9866 cubic feet per ton of Coal carbonized were brought to charge and duly paid for, with the exception of about 6s. per cent. for bad debts. The coke is of excellent quality. The above facts I hold to be a greater recommendation to your Coal than any words of mine could be."

THE TYNE COAL COMPANY, LIMITED, OWNERS.

W. RICHARDSON, Fitter,

29, QUAYSIDE, NEWCASTLE-ON-TYNE.

TORBAY AND DART PAINT COMPANY, LIMITED.

WORKS:

DARTMOUTH & BRIXHAM (TORBAY) DEVON.

OFFICES:

23, GREAT GEORGE STREET, WESTMINSTER, LONDON, S.W.

SOLE PROPRIETORS AND MANUFACTURERS OF

WOLSTON'S CELEBRATED

TORBAY IRON PAINTS.

TRADE MARK

These Paints have been for many years extensively used in Her Majesty's Royal Dockyards, Woolwich Arsenal, the Shorncliffe and Curragh Camps, War Departments, and Colonies, and are largely supplied to Railway, Harbour, and GAS COMPANIES, Shipowners, Engineering Establishments, Railway Carriage and Wagon Works, and the Paint Trade generally. They are the BEST PROTECTORS of WOOD, CEMENT, and IRONWORK, even arresting corrosion after it has set in; and their base being oxide of iron, they are free from those properties which make lead paints so destructive to iron. They do not scale or blister, are not affected by great heat, and are the only Paints which will resist the effects of sulphuretted hydrogen. Their DURABILITY and covering properties have borne the test of A QUARTER OF A CENTURY'S PRACTICAL TRIAL.

The undermentioned colours—ground in best linseed oil, and requiring only to be thinned down for use in the ordinary way—are kept in stock:—

Torbay Brown.	Torbay Red.
Dart Green.	Slate.
Dart Yellow.	Buff.
Brixham Black.	Torbay Chocolate.
Light Blue.	Cream Colour.
Dart Brown.	Dart Umber.
Imperial Stone.	Light Stone.
Bronze Green.	Salmon Colour.
Navy Green.	Lead Colour.
Carriage Red.	Dark Stone.
Light Lead.	Crystal Palace Blue.
Light Green.	Iron Grey.

All other Colours made to order.

READY-MIXED PAINTS.

A great variety of Colours ready mixed for the brush are also always kept in Stock, in 3 lb., 7 lb., 14 lb., and 28 lb. cans.

Prices and Testimonials on application.

PRICE'S PATENT COKE & COAL BARROW

effecting a great saving of time, labour, and expense.

For particulars, price, &c., apply to Mr. E. PRICE, Inventor and Patentee, Gas-Works, Hampton Wick, MIDDLESEX.

THOMAS LAMBERT & SONS

MANUFACTURE EVERY DESCRIPTION OF

GAS AND WATER FITTINGS;

ALSO,

WROUGHT-IRON TUBES & FITTINGS.

SHORT STREET, LAMBETH, LONDON.

GEORGE ORME & CO.,

ATLAS METER-WORKS, OLDHAM,

MANUFACTURERS OF

WET AND DRY GAS-METERS.

STATION-METERS, GOVERNORS,

PRESSURE AND EXHAUST REGISTERS,

LAMP-METERS IN CAST-IRON BOXES,

And every Description of Gas Apparatus.

THE WIGAN COAL & IRON COMPANY,

LIMITED.

DISTRICT OFFICE: 97, NEW STREET, BIRMINGHAM; AGENT: W. M'GOWAN;

Supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, &c.

N.B.—The Wigan Coal and Iron Company, Limited, are exclusive owners of the well-known HAIGH HALL AND KIRKLESS HALL GAS COAL COLLIERIES.

TO GAS AND RAILWAY COMPANIES, LOCAL BOARDS, ENGINEERS, CONTRACTORS, SHIPPERS, &c.

WILLIAM KEEN,

SOLE PROPRIETOR AND MAKER OF

KEEN'S PATENT DOUBLE-FRAME CLIP-LAMP,

AND MANUFACTURER OF

EVERY DESCRIPTION OF STREET-LAMPS.

FOR PARTICULARS, APPLY TO

W. KEEN, 23, ROBERTSON ST., & 5 & 6, PRIORY STREET, HASTINGS, SUSSEX.

HODGE & CO.'S

IMPROVED VENTILATING SUN-LIGHTS

WITH TALC REFLECTORS AND SELF-ACTING VALVES

TO PREVENT DOWN-DRAUGHT;

VENTILATING GLOBE LIGHTS for DINING-ROOMS, LIBRARIES, &c.

Ormolu, Bronze, & Crystal Gaseliers;

MEDIÆVAL CHURCH WORK AND CORONÆ

COCKS, VALVES, and FITTINGS for GAS, STEAM, and WATER;

COLUMNS, BRACKETS, & STREET LANTERNS;

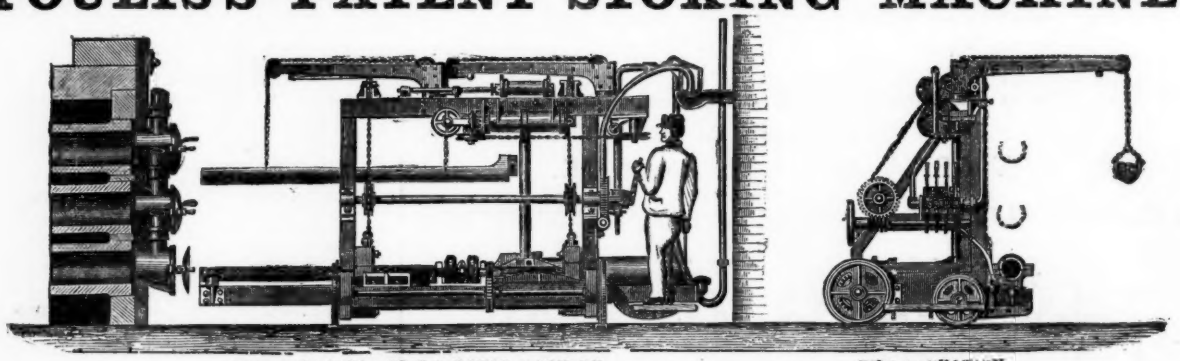
BLACK AND GALVANIZED BARREL COMPO AND TIN PIPE.

GAS ENGINEERS,

100, HATTON GARDEN, LONDON.

Drawings and Prices upon application.

FOULIS'S PATENT STOKING MACHINE.



SIDE ELEVATION OF CHARGING MACHINE. END ELEVATION

(The Drawing Machine will be Illustrated in next week's Advertisement.)

Makers: TANGYE BROTHERS and HOLMAN, London and Birmingham; ADAM WOODWARD and SON, Manchester; ROBERT LAIDLAW and SON, Glasgow; MASCHINENBAU-ACTIEN-GESELLSCHAFT HUMBOLDT, Kalk bei Deutz;

Or all particulars may be had from JAMES WOTHERSPOON, 31, St. Vincent Place, Glasgow.

FLETCHER AND MURPHY,

GARRATT STREET WORKS, OLDHAM ROAD, MANCHESTER;

Manufacturers of

IMPROVED CONSUMERS WET GAS-METERS

IN CAST-IRON CASES,

THE UNVARYING WATER-LINE GAS-METER,

AND

IMPROVED DRY GAS-METERS;

STATION-METERS OF ALL SIZES, with PLANED JOINTS;

GOVERNORS, PRESSURE AND EXHAUST REGISTERS, TEST HOLDERS.

And all kinds of Experimental Gas Apparatus.

WILLEY & COMPANY,

GAS ENGINEERS,

WORKS: COMMERCIAL ROAD, EXETER,

INVITE THE ATTENTION OF GAS COMPANIES AND OTHERS FOR THE SUPPLY OF

EVERY DESCRIPTION OF GAS APPARATUS.

ENGINEERING DEPARTMENT.

NEW GAS-WORKS erected complete. Plans and Estimates furnished. MAINS, METERS, SERVICES, LAMPS, &c., adapted for Towns of any size. Gas Companies advised on Improvements, Extensions, and Alterations of Works.

GASHOLDERS AND TANKS.

RETORTS and RETORT-HOUSE FITTINGS, CONDENSERS, SCRUBBERS, ENGINES and EXHAUSTERS, PURIFIERS, STATION-METERS, GOVERNORS, VALVES, &c.

METER DEPARTMENT.

They beg special attention to the excellence and superiority of their WET and DRY METERS, several thousand being now in use by many of the largest Gas Companies in the West of England and South Wales. Warranted to measure correctly, and not to vary. Their acknowledged superiority has brought them into general use more rapidly than any Meters hitherto manufactured. A guarantee of Five years tendered with each Meter.

GAS-FITTING DEPARTMENT.

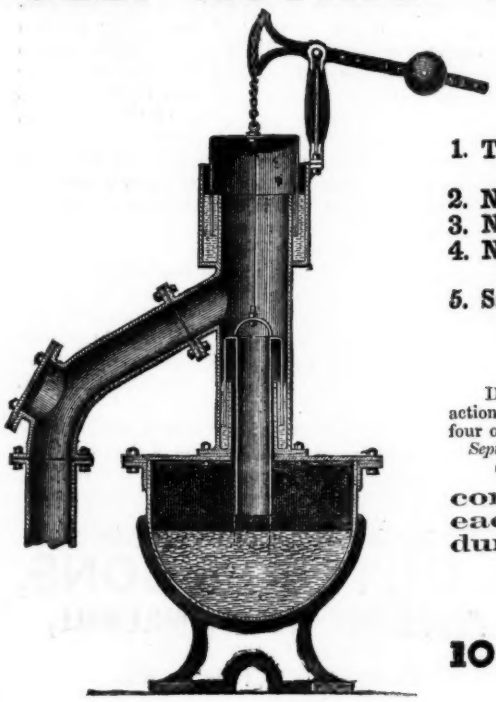
An extensive variety of Choice Designs in CHANDELIERS, PENDANTS, BRACKETS, STAR and SUN LIGHTS, MEDIÆVAL FITTINGS for CHURCHES, &c.

PATTERN-BOOKS and PRICE LISTS furnished.

☞ PLEASE NOTE THE ADDRESS—

GAS ENGINEERING WORKS, COMMERCIAL ROAD, EXETER.

SELF-ACTING REMOVABLE DIP-PIPE,



PATENTED BY

CHANDLER & STEVENSON.

ADVANTAGES.

1. There is no pressure on the Retorts.
2. No deposit of Carbon.
3. No scurfing is required.
4. Never a choked Ascension-Pipe.
5. Saves Fuel and Wear and Tear.
6. Gets 10 per cent. more Gas out of the Coal, and a higher Illuminating Power.
7. Is never out of order.
8. Requires no attention.
9. Is perfectly automatic in its action.

Testimonial from the Proprietor of the Apeldorn Gas-Works.

DEAR SIR,—In reply to your inquiry, the Self-Acting Dip-Pipes, which have been in action at my works for two years, give entire satisfaction. I forward you order for four others.

Yours truly,

Sept. 9, 1877. R. BAKKER.

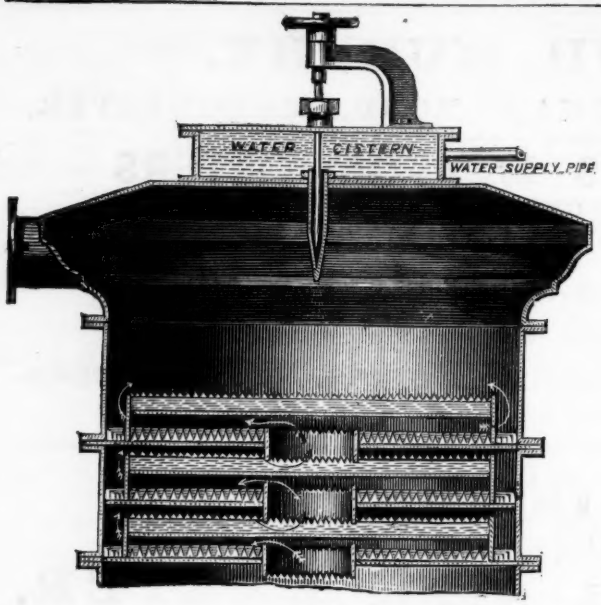
These Dip-Pipes can now be supplied complete, except the flanched bend, for £4 each, which includes the charge for licence during the whole term of the patent.

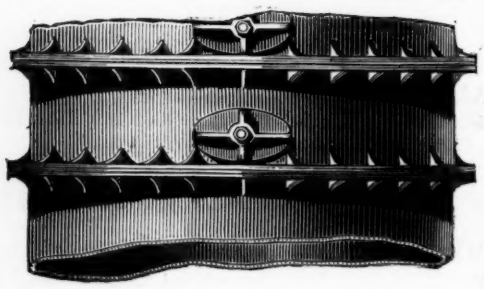
APPLICATIONS TO BE MADE TO

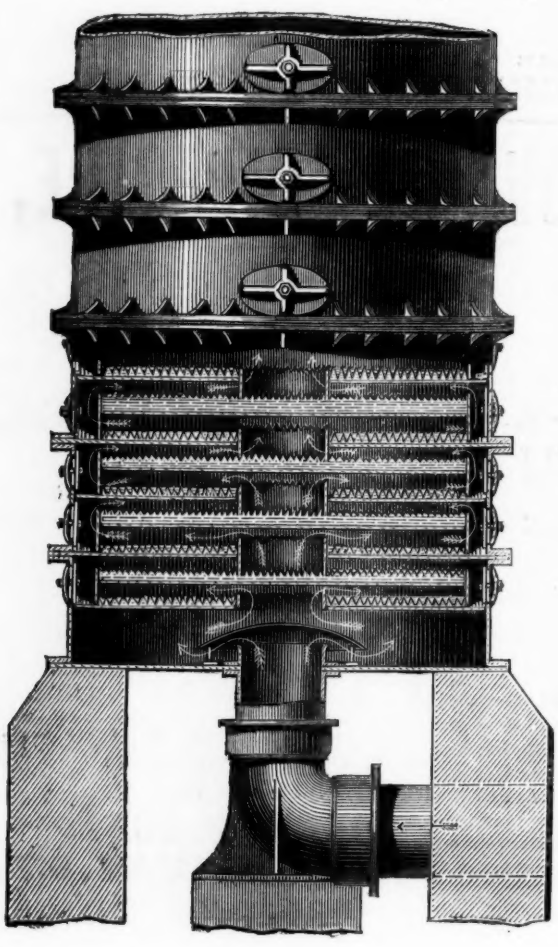
Messrs. CHANDLER & SONS,

104, NEWINGTON CAUSEWAY, S.E.,

Who fix the Dip-Pipes, at a small Charge, when required.







SAMUEL CUTLER & SONS

CONTRACTORS FOR GAS & WATER WORKS,
GENERAL ENGINEERS, IRONFOUNDERS;
AND
MANUFACTURERS OF

Gasholders, Tanks, Purifiers,

SCRUBBERS, VALVES, EXHAUSTERS,

IRON ROOFS,

BRIDGES, BOILERS, AND GENERAL CAST AND WROUGHT IRON WORK.

S. C. & Sons undertake the entire Erection of New, or Remodelling of existing Gas-Works in any part of the World, including small Works for MANSIONS, FACTORIES, &c., or Works of the largest extent (are now constructing the largest Gasholder yet erected); also the Supplying and Laying of MAINS.

They make a speciality of supplying every requisite whatever for a Gas-Work, keeping in Stock what are most in request. WOOD SIEVES for Purifiers and Scrubbers, of a superior make.

SPECIAL CASTINGS to Drawing or Pattern at Shortest Notice.

MANUFACTURERS OF

CUTLER'S

PATENT GAS-WASHER

AND

MORRIS & CUTLER'S

PATENT CONDENSER.

(For Illustration and Description, see "Journal" for Sept. 18, page 470.)

DESCRIPTION OF CUTLER'S PATENT GAS-WASHER.

The Washer consists of a vessel or tower of a cylindrical or other form, convenient to the site available for it. The interior is fitted with a number of dished trays arranged as shown, one above the other, from bottom to top. The flanges or sides of these trays are formed with serrated edges, and are arranged so that each tray contains a certain depth of water or liquor; the position and size of the serrated orifices in the dipping edges being such that the upper parts are slightly above the water, and so that the combined area of these small orifices is proportionate to the size of the inlet-pipe, the gas passing through without increase of pressure, and diffused in thinly divided streams. All the other edges are likewise serrated, so that the liquor passes over same in small streams, and so that the gas cannot pass through in bulk. The water or washing liquor is admitted at the top, the supply being governed by a conical needle regulating-valve so that the amount can be regulated to any desired quantity. The gas is admitted at the bottom and out at the top, the water or liquor descending the one meeting the other, and thus being brought into the very closest contact, and the gas consequently being deprived of its ammonia and other impurities absorbed by water or other liquor.

Where a slight increase of pressure is not of great consequence, we prefer to allow some of the lower tiers of trays to be slightly sealed, the better to arrest any tar or heavy oils that may have passed the condenser.

For further Particulars, apply to

S. CUTLER & SONS,

PROVIDENCE WORKS, MILLWALL,

(NEAR THE STEAMBOAT PIER,)

LONDON, E.

WILLIAM SUGG,

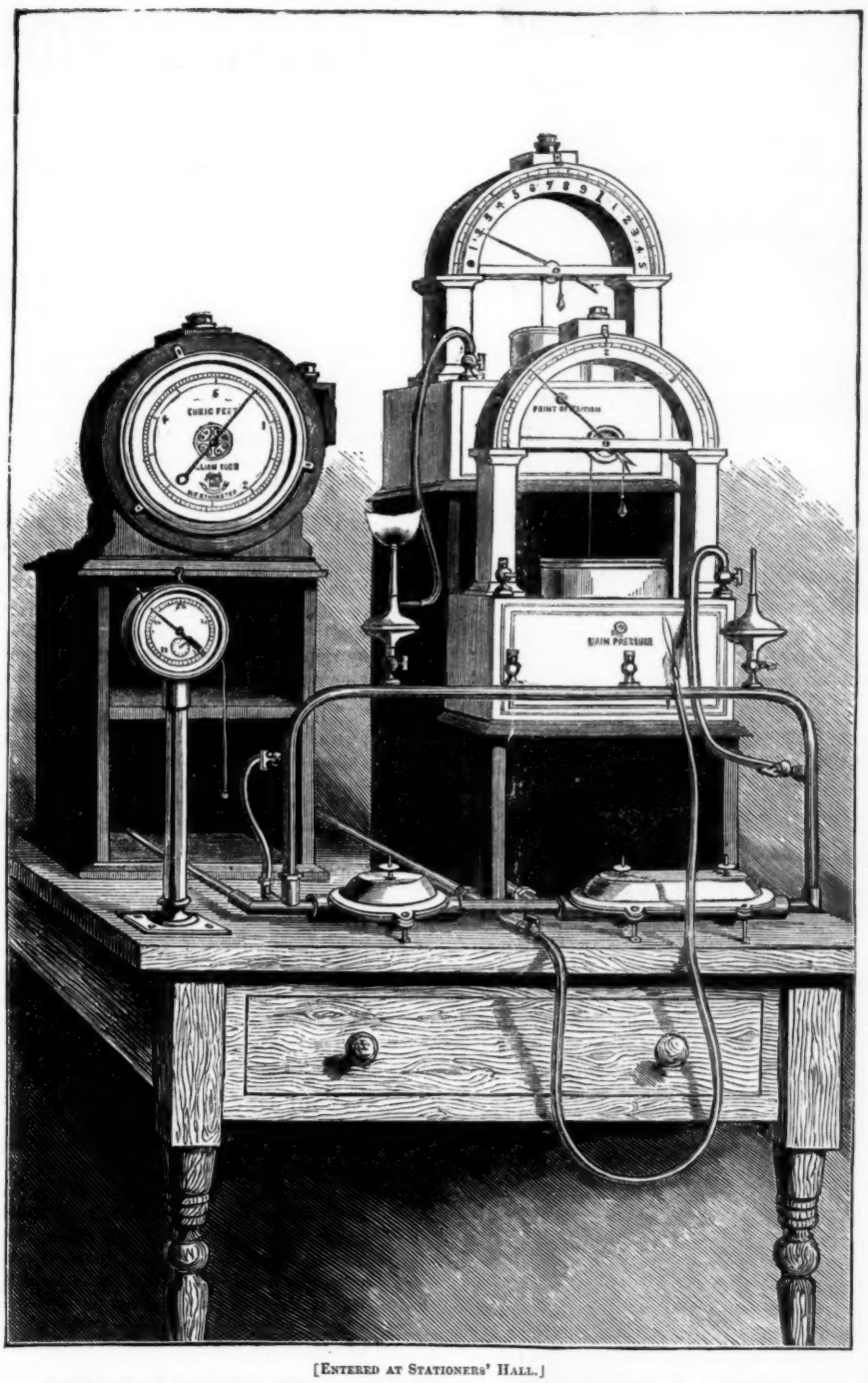
GAS ENGINEER,

VINCENT WORKS, VINCENT STREET,

WESTMINSTER, S.W.

SUGG'S IMPROVED PATENT STREET-LAMP METERS.
(KENSINGTON PATTERN.)

SUGG'S IMPROVED REGISTERED STREET-LAMP COLUMNS AND LANTERNS.
(SALFORD PATTERN.)



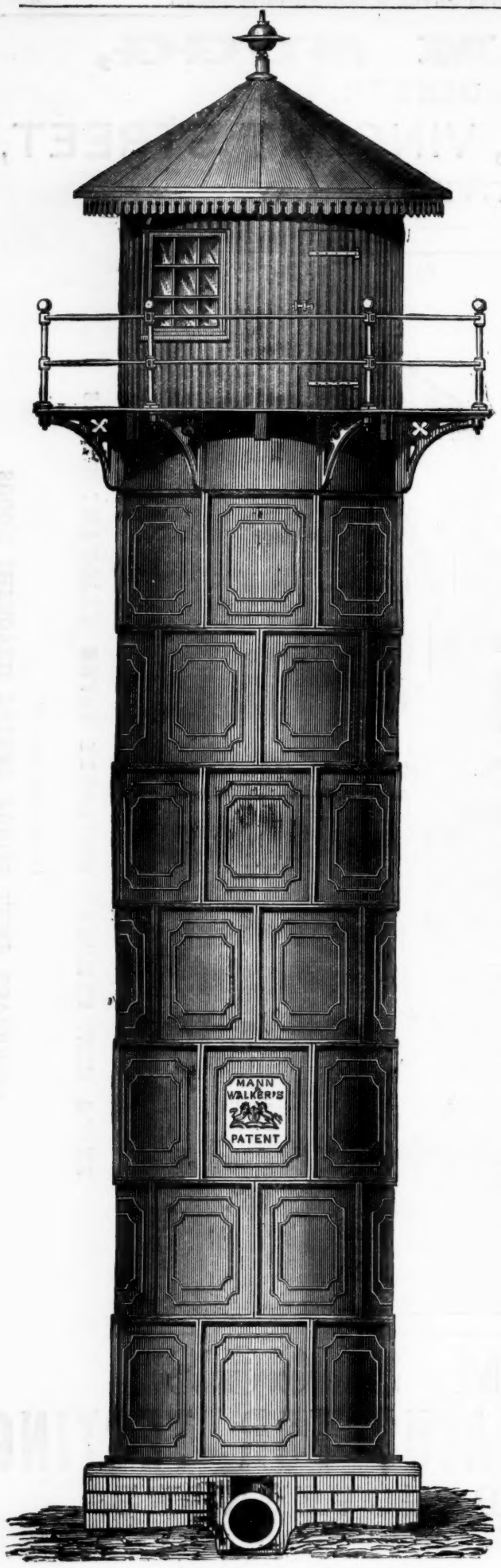
SUGG'S IMPROVED PATENT PUBLIC LAMP GOVERNORS.
(DOUBLE REGULATION.)

SUGG'S IMPROVED BRASS LIGHTING TORCHES AND COCKS.

[ENTERED AT STATIONERS' HALL.]

WILLIAM SUGG'S
IMPROVED APPARATUS FOR TESTING
STREET-LAMP GOVERNORS.

PRICES COMPLETE, AS ABOVE, ON APPLICATION.



C. & W. WALKER,
8, FINSBURY CIRCUS,
LONDON, E.C.

MANN & WALKERS' PATENT SCRUBBER.

By Letters Patent in Great Britain, Europe, and the United States of America.

By some important improvements recently patented, the purifying power of these Scrubbers has been much increased, and a stronger ammoniacal solution obtained, which is found to absorb a large portion of the carbonic acid contained in gas, effecting an important saving in money and labour in the lime purifiers, and where oxide only is used, the increase in the illuminating power of the gas obtained by these Scrubbers is shown in a remarkable degree, in consequence of the large quantity of carbonic acid removed from the gas.

It is to be particularly noted that the im-portant results of these Scrubbers do not depend upon the machinery alone. The entire internal construction of the Scrubber bears an almost equally important part. For this reason, where it is desirable to convert existing Scrubbers, whose dimensions happen to be suitable, the work commences by ripping out the whole of the interior of the shell, and beginning the internal construction *de novo* from bottom to top.

They are, in all cases, constructed under guarantees to perfectly perform their work. They are now extensively used in the largest gas-works of London and the chief cities of Europe, the number in use exceeds **one hundred,** and their perfect efficiency and profit to a gas company have been fully established with every variety of coal used in Europe. References can be given to the largest gas-works in Europe.

By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade, relating to incorporate gas companies, are satisfied.

Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals, generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

They contain their own engine power, re-quiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

Applications relating to dimensions and prices should be addressed to us, C. AND W. WALKER, 8, FINSBURY CIRCUS, LONDON, E.C., or to Mr. WILLIAM MANN, late Superintendent of the Chartered Gas-Works, BLACKFRIARS, LONDON; they should state approximately the largest make of gas in 24 hours on a winter's day, and the smallest make on a summer's day, to be purified.

F. & C. OSLER,

45, OXFORD STREET, LONDON, W.

MANUFACTORY AND SHOW-ROOMS:

BROAD STREET, BIRMINGHAM.

ESTABLISHED 1807.

MANUFACTURERS OF CRYSTAL GLASS CHANDELIERS

WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES.

TABLE GLASS OF ALL KINDS.

CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.

GEORGE ANDERSON,

GAS AND CONSULTING ENGINEER,

35A, GREAT GEORGE STREET,

WESTMINSTER, S.W.,

PATENTEE and MANUFACTURER of the following Inventions:—

RETORT SETTINGS—giving great Economy of Fuel.

STEAM-ENGINES and EXHAUSTERS, FOUR-WAY VALVES, WASHERS, SCRUBBERS.

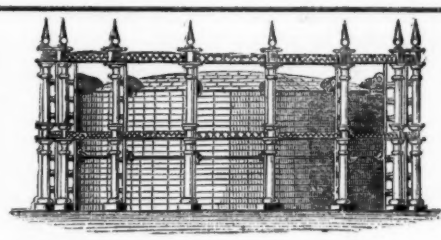
FUEL-MACHINE, for Compressing Breeze and Tar.

N.B.—Pamphlet, with Eighteen Illustrations and Letterpress on the Construction of Gas-Works, post free, 2s. 6d.

PRICES AND ALL PARTICULARS TO BE HAD OF THE PATENTEE,

35a, GREAT GEORGE STREET, WESTMINSTER, S.W.

HOPE IRON WORKS,



STOCKTON ON TEES.

ASHMORE & WHILE,

GAS ENGINEERS & CONTRACTORS,

MANUFACTURERS OF GASHOLDERS,

GAS APPARATUS OF EVERY DESCRIPTION,

Including Improved

Retort-Lids, Boilers, Cast and Wrought Iron Tanks, Iron Roofing, Bridges, Girders,

And GENERAL IRONWORK.

N.B.—Estimates for all Gas Plant and Remodelling supplied on application.

LESMAHAGOW CANNEL COAL.

FERRAND DAVIES,

148, GRESHAM HOUSE, OLD BROAD STREET, LONDON, E.C.,

SOLE AGENT FOR

THOMAS BARR'S LESMAHAGOW MAIN CANNEL.

Quotation and Analysis forwarded on application.

NOTICE OF REMOVAL.

G. J. EVESON,

GAS COAL AND CANNEL CONTRACTOR,

Begs to intimate to his numerous connexion that, for the convenience of Gas Managers and others waiting upon him, he has removed from

89, HIGH STREET, STOURBRIDGE,

and that in future his HEAD OFFICES will be

123, NEW STREET, BIRMINGHAM,

Where all communications and inquiries should be addressed.

ROBERT MARSHALL,

CANNEL COAL MERCHANT,

173, ST. VINCENT STREET, GLASGOW.

SHOTT'S BOGHEAD.

LOTHIAN'S CANNEL

Yields 12,500 cubic feet of 34-candle gas per ton, and 9 cwts. of excellent coke, containing only 4 per cent. of ash.

MUIRKIRK, No. 1, CANNEL

Yields 12,160 cubic feet of 32·5-candle gas per ton, and 10 cwts. of excellent coke, containing only 5 per cent. of ash.

OLD WEMYSS CANNEL

Yields 13,320 cubic feet of 32·5-candle gas per ton.

Prices and full Analyses on application.

GAS COAL.

POPE & PEARSON, LIMITED, have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields *in practical working over* 10,000 *cubic feet of gas, with an illuminating power of* 16 *candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12¼ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

For further particulars, apply to POPE AND PEARSON, LIMITED, West Riding and Silkstone Collieries, near LEEDS.

SCOTCH CANNEL COALS.

The Subscriber is prepared to contract for the supply of all the principal SCOTCH CANNEL COALS. Prices and Analyses of the various Coals will be forwarded on application.

JAMES M'KELVIE,

CANNEL COAL MERCHANT,

HAYMARKET, EDINBURGH.

Established 1840.

HOPKINS, GILKES, & CO.,

LIMITED,

MIDDLESBOROUGH,

SUPPLY GAS & WATER PIPES of EVERY SIZE.

Plain, Turned and Bored, and Coated.

CAST-IRON RETORTS.

Castings for Gas-Works of every description.

EXHAUSTERS.

LONDON OFFICE: 25, LAURENCE POUNTNEY LANE.

CLOTH GAS-BAGS FOR MAINS,

As supplied to the Imperial, Chartered, and other London and Provincial Gas Companies. Bellows and Valves for inflating Well Dresses, Stokers Gloves, India-Rubber Suction and Delivery Hose, Gas-Tubing, Leather, India-Rubber, and Gutta-Percha Machine-Bands, Sheet and Washers, and Steam Joints.

T. BUGDEN, Manufacturer,

79, GOSWELL ROAD, LONDON, E.C.

TO GAS COMPANIES.

GEORGE McKAIG,

MANUFACTURER OF

GAS-PURIFYING WOOD SIEVES,

153, CLEVELAND STREET,

DONCASTER.

It requires but one trial to prove the Superior Make, Strength, and Durability of these Sieves.

CARRIAGE PAID.

GRIRDROD'S PATENT PORTABLE PIPE SCREWING MACHINE,

For 1 in., 1¼ in., 1½ in., and 2 in. Gas Threads, complete £7 10s.

In use at the chief gas-works, and giving great satisfaction.

For other useful goods, see Bailey's "Illustrated Inventions," post free 3s. 6d.; gratis to ledger customers.

W. H. BAILEY & CO.,

Brassfounders, Gauge Injector and Tool Makers,

ALBION WORKS, SALFORD, LANCASHIRE.

Established

1795.

JOSEPH CLIFF & SONS,

THE ORIGINAL

WORTLEY FIRE-BRICK WORKS,

NEAR LEEDS,

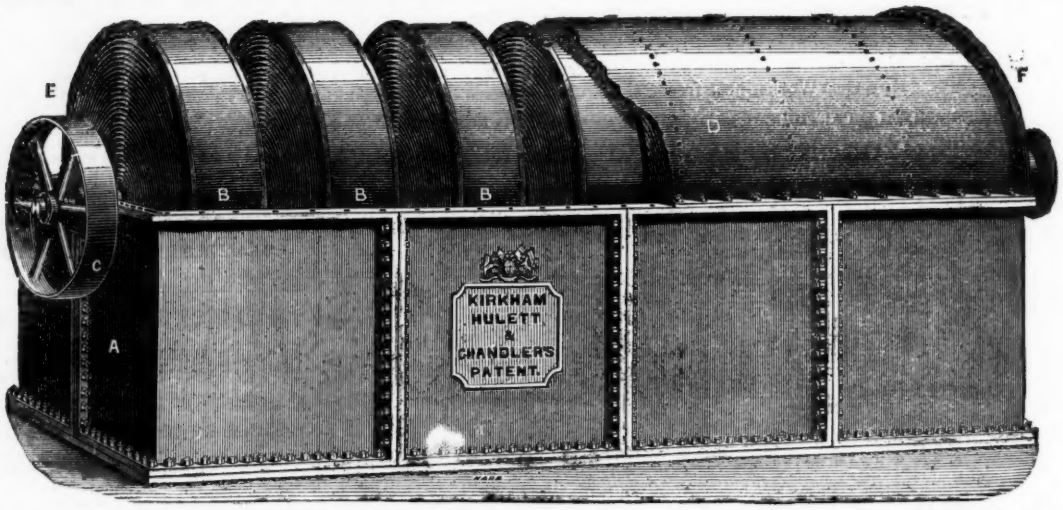
London Wharf: No. 4, inside Great Northern Goods Station, King's Cross, N.;

LIVERPOOL: Back Leeds Street.

SPECIAL NOTICE.—Our Patent Machine-made Retorts have now been in *actual work* nearly 1000 days, and are yet in good order. References on application.

July 2, 1877.

STANDARD WASHER AND SCRUBBER.



The advantages of the Apparatus will doubtless be understood by those interested in gas manufacture.

The principal points of any Apparatus for the extraction of ammonia may be summarily stated as follows: —

1. **A large amount of Surface is desirable.**
2. **Such Surface should be always effectually Wetted.**
3. **The Surfaces or Scrubbing Material should cause no Pressure.**
4. **The Gas should meet various strength Liquors on its course.**
5. **However small the quantity of Water used, it ought to operate over the whole Surface.**
6. **Changing Scrubbing Material is both Objectionable and Expensive.**
7. **Economy both as to Space occupied and Cost of Apparatus is an important item.**

All these requisitions are supplied by the above Apparatus, of which the following is an explanation:—

A is a cast-iron tank, formed into several separate water-tight compartments.

B B B volutes of sheet iron fitted to the centre shaft, which is driven by the pulley, C, and causing the said volutes to revolve each in a separate compartment filled with water or other fluid.

D, the cover, has partitions fitted into it corresponding with those in the tank, sufficient space being left between the top of the partition in the tank and the lower edge of that in the cover, to allow the gas a free passage through the first volute to the second, and so on to the third, fourth, &c.

The action is as follows:—The crude gas entering at E is partly washed in the first compartment, which becomes 10 or 12 oz. liquor, or stronger if required, according to the quantity allowed to enter per ton; the gas then passes to the second, where the liquor is of a less strength; thence into a weaker liquor, as it passes from one compartment to the other, finishing at the last compartment or outlet, F, with clean water, which is constantly flowing and running over from one compartment to another, until it reaches the last space, from which it flows from the outlet-pipe into the well or tank ready for sale or removal.

Taps are inserted in each compartment for the convenience of drawing liquor for testing, &c.

Applications as to Cost, &c., may be obtained of either

Mr. D. HULETT, 55 & 56, HIGH HOLBORN;

Messrs. KIRKHAM & HERSEY, GAS ENGINEERS, 21, ABINGDON STREET, WESTMINSTER;

Or Messrs. CHANDLER, 104, NEWINGTON CAUSEWAY.

Inquirers will please state their Maximum Day Make.

THE SILKSTONE & DODWORTH COAL & IRON COMPANY, LIMITED,

DODWORTH, BARNSLEY.

BENJAMIN WHITWORTH, Esq., M.P. . . . . Chairman.
Mr. RICHARD HARTLEY . . . . . Managing Director.

REAL OLD SILKSTONE GAS COAL.

JAMES PATERSON, Esq., Gas Engineer, of the Warrington Gas Company, reported, Aug. 10, 1875:—

"This Coal possesses remarkable qualities as a gas and coking coal, and appears SECOND TO NONE IN THE KINGDOM. It contains the large quantity of 699 lbs. of illuminating matter, and 1498 lbs. of coke to the ton, and produces **12,240** cubic feet of 16·66 candle gas."

The above Company are raising nearly a thousand tons of the Real Old Silkstone Gas Coal per working day.

PRICES QUOTED TO ANY RAILWAY STATION, OR F.O.B. HULL, GRIMSBY, GOOLE, KEADBY, LIVERPOOL, AND FLEETWOOD.

AND PARLIAMENTARY APPLICATIONS CONDUCTED

ROBT. DEMPSTER & SONS,

GAS ENGINEERS, IRONFOUNDERS, AND CONTRACTORS,

ROSE MOUNT IRON-WORKS, ELLAND, YORKSHIRE,

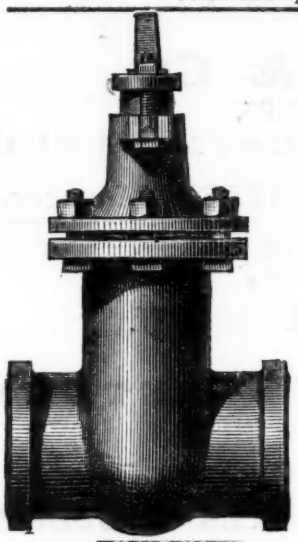
MANUFACTURERS OF EVERY DESCRIPTION OF

GAS APPARATUS;

CONTRACTORS FOR THE

ERECTION OF PUBLIC AND PRIVATE GAS-WORKS.

Plans and Specifications Prepared, and Illustrated Catalogues forwarded on application.



WATER-VALVES.
All Sizes, Flange and Socket, kept in Stock, tested to 1000 feethead.

SIMPSON & COMPANY,

ENGINE-WORKS,

GROSVENOR ROAD, PIMLICO,

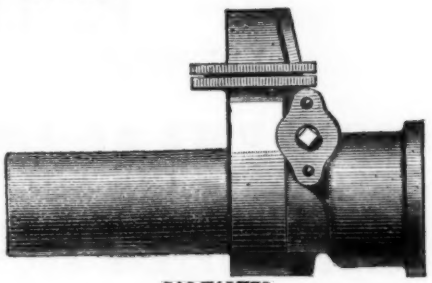
LONDON.

SCREW-COCKS, HYDRANTS,

SLUICES, PENSTOCKS,

And all other Machinery for

WORKS OF WATER SUPPLY, DRAINAGE AND IRRIGATION.



GAS-VALVES.
All Sizes, Flange and Socket, kept in Stock, tested to 100 feet head.

NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS AND COLLIERIES,

NEAR SHEFFIELD.

CELEBRATED SILKSTONE GAS COALS.

The various descriptions of Gas Coal produced from the above Collieries possess an unequalled reputation, combining in a large degree the constituents essential for the production of the best quality of Coke and Gas of a high illuminating power.

A recent extensive development of the Collieries enables us to offer increased supplies.

JAS. PATERSON, Esq., of Warrington, after testing various qualities of our Coal, has sent the following testimony of their merits:—

"*Warrington Gaslight and Coke Company,*
Offices, Mersey Street, Warrington, April 23, 1877.

"MESSRS. NEWTON, CHAMBERS, AND CO.,

"GENTLEMEN,—After carefully testing the various samples of Gas Coals sent from your Collieries for analysis, I have pleasure in reporting them as belonging to the highest class of Gas and Coking Coals.

"The average of Nine samples gives a yield of **12,500** cubic feet of **15½**-Candle Gas, being equivalent to **664** lbs. of sperm per ton, and **1420** lbs. of fixed carbon of a very superior quality. All the samples bear a close relation to each other in value.

"Yours truly, "JAMES PATERSON."

Full particulars will be sent on application to us—address as above.

THE

UNVARYING WATER-LINE GAS-METER.

(SANDERS AND DONOVAN'S PATENT.)

"Unquestionably the best Water Gas-Meter now in use."—THOS. G. BARLOW, C.E.

Over 120,000 in action.

MANUFACTURERS:

THE GAS-METER COMPANY, LIMITED,

KINGSLAND ROAD, LONDON;

WITH

Branch Manufactories at DUBLIN and OLDHAM.

MR. A. VERNON HARCOURT'S COLOUR TESTS,

FOR BISULPHIDE OF CARBON, SULPHURETTED HYDROGEN, AND CARBONIC ACID IN COAL GAS.

The usual method by which the quantity of sulphur in coal gas is determined demands much time and considerable manipulative skill, as well as expensive apparatus. With Mr. Harcourt's Apparatus a test may be easily made by any intelligent person within a quarter of an hour, and the quantity of sulphur in any sample of gas ascertained within two or three grains per 100 cubic feet.

The Tests for Sulphuretted Hydrogen and for Carbonic Acid are equally simple.

THIS APPARATUS OUGHT TO BE POSSESSED BY EVERY GAS COMPANY.

Descriptive Particulars sent on receipt of 2d. in Stamps.

ALEXANDER WRIGHT & CO.,

GAS-METER AND APPARATUS MANUFACTURERS,

55, 55a, & 56, MILLBANK STREET, WESTMINSTER, LONDON, S.W.

F. W. HARTLEY, Manager.

R. LAIDLAW AND SON,

EDINBURGH AND GLASGOW.

Manufacturers of

CONSUMERS IMPROVED WET GAS-METERS,

THE UNVARYING WATER-LINE GAS-METERS,

IMPROVED DRY GAS-METERS, in Cast-Iron or Tin-Plate Cases;

STATION-METERS, ALL SIZES, up to 15 feet Square, with PLANED JOINTS;

Experimental Meters, Photometers, Pressure-Gauges, Governors, Test Holders, &c., &c.

LONDON OFFICE: 106, CANNON STREET, E.C.

JOHN ABBOT & CO., LIMITED,

MANUFACTURERS OF

IMPROVED

HYDRAULIC CRANES & HOISTS,

Effecting an IMMENSE SAVING in the cost of discharging Coals from Vessels, Barges, &c.

HYDRAULIC RAMS FOR LIFTING AND LOWERING PURIFIER COVERS.

GAS PLANT GENERALLY, PIPES, ROOFING, TANKS, &c.,

PARK WORKS, GATESHEAD.

LONDON OFFICES: 2, SUFFOLK LANE, CANNON STREET, E.C.

GLASGOW OFFICES: 54, ST. ENOCH'S SQUARE.

London: Printed by WILLIAM BOUGHTON KING (at the office of Clayton and Co. 17, Bouverie Street, Fleet Street); and published by him at No. 11, Bolt Court Fleet Street, in the City of London.—Tuesday, Oct. 2, 1877.